

Just Transition and Economic Diversification of Jharkhand's Coal Heartland

Ground-up Studies from Ramgarh and Bokaro

Rishi Kishore, Sandeep Pai, Deeksha Pande, Arpita Kanjilal,
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Established in 2002, the Digital Empowerment Foundation (DEF) operates in over 2,000 locations across 250 districts in 28 states. DEF's work focuses on enabling digital access, capacity-building, and rights in areas like education, livelihoods, health, agriculture, climate, and culture, with a strong emphasis on empowering women and youth.

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List of Abbreviations

ATMA	Agriculture Technology Management Agency
BIADA	Bokaro Industrial Area Development Authority
CCL	Central Coalfields Limited
CIL	Coal India Limited
CPO	Chief Planning Officer
CSC	Common Service Centre
CSO	Civil Society Organisation
CSR	Corporate Social Responsibility
DAV	Dayanand Anglo Vedic
DC	Deputy Commissioner Cum District Magistrate
DDUGKY	Deen Dayal Upadhyaya Grameen Kaushalya Yojana
DFO	Divisional Forest Officer
DIC	District Industry Center
DISCOMs	Distribution Companies
DMF	District Mineral Foundation
DPPH	Domestic Promotion and Publicity including Hospitality
FGD	Focus Group Discussion
FPO	Farmer Producer Organization
GDDP	Gross District Domestic Product
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographic Information System
GM	General Manager
CSR	Corporate Social Responsibility
GST	Goods and Services Tax
SGST	State Goods and Services Tax
GW	Gigawatt
Ha	Hectare
IEA	International Energy Agency

iFOREST	International Forum for Environment, Sustainability, and Technology
INR	Indian National Rupee
ITI	Industrial Training Institute
JHAMFCOFED	Jharkhand State Minor Forest Produce Cooperative Development and Marketing Federation Limited
JIADA	Jharkhand Industrial Area Development Authority
JIIPP	Jharkhand Industrial and Investment Promotion Policy
LPG	Liquified Petroleum Gas
MFP	Minor Forest Produce
MGD	Million Gallons per Day
MoEF&CC	Ministry of Environment, Forest and Climate Change, Government of India
MPTDC	Multi Purpose Tribal Development Centre MSME Micro, Small and Medium Enterprises
MSME-DC	Development Commissioner Ministry of Micro, Small & Medium Enterprises
MT	Million Tonne
MTPA	Million Tonnes Per Annum
MW	Megawatt
NDCs	Nationally Determined Contributions
NTPC	National Thermal Power Corporation
OB	Overburden
OC	Open cast
OCP	Open Cast Project
ODOP	One District One Product
PCI	Per Capita Income
PLI	Performance Linked Incentive
PMFME	Pradhan Mantri Formalisation of Micro Food-Processing Enterprises
PMKVY	Pradhan Mantri Kaushal Vikas Yojana
PV	Photovoltaics
PRI	Panchayat Raj Institutions
RE	Renewable energy

SAIL	Steel Authority of India Limited
SCB	Schedule Commercial Bank
SHGs	Self-help Group
SME	Small and Medium Enterprise
SoEs	State-Owned Enterprises
TPP	Thermal Power Plant
USD	United States Dollar
UG	Underground
WB	World Bank

Executive summary

The year 2024 marked a crucial turning point in climate change—global mean temperatures exceeded 1.5°C above pre-industrial levels for the first time in recorded history. This unprecedented shift underscores the urgent need for decisive climate action on a global scale. With this tipping point breached, the need for reducing greenhouse gas emissions has never been more critical.

Given this urgency to tame the greenhouse gas emissions curve, along with India's commitment to achieving net zero emissions by 2070, a phase-down of coal must be approached with strategic planning.

Some key insights and recommendations are summarised below:

1. Household dependency

1. In both Ramgarh and Bokaro, approximately 10% of the households are employed in the coal mining industry.
2. In terms of social infrastructure dependency, 3% of households in Ramgarh and 10% in Bokaro reside in housing provided by coal mining company Central Coalfields Limited (CCL) or thermal power companies.
3. Coal is the primary cooking fuel in both the districts. In Ramgarh, 9 out of 10 households rely on coal for cooking, while in Bokaro, 5 out of 10 are dependent on coal for their cooking needs.

2. Industrial dependency

1. Our survey shows that 73% of registered enterprises in both districts rely on the coal sector for their revenue by serving customers engaged largely in the coal sector, providing coal transportation services, and supplying machinery and equipment to coal and thermal power companies.
2. The use of coal-based boilers is another kind of dependency for industries. Among registered enterprises, the proportion of businesses relying on coal-based boilers is notably higher in Ramgarh, where 74% of enterprises use them. By contrast, in Bokaro, 23% of registered enterprises depend on coal-based boilers for their operations.

3. Diversification

1. While many households still want their children to find work in the coal sector, there is also considerable interest in transitioning to non-coal industries, such as pisciculture, tourism, among others.
2. Based on household and enterprise surveys, we identify several sectors for economic diversification in both districts (Table 1). These sectors reflect the aspirations and comparative advantages of the district. Focusing on these sectors would help local enterprises, households and overall communities transition to more sustainable alternatives.

Table 1: Potential sectors for diversification by district and block

The table illustrates the sectors for diversification at the block-level in each district based on household and enterprise surveys, interviews, policy assessments, and an evaluation of the comparative advantages of each block.

District	Sectors	Blocks
Ramgarh	Tourism	Chittarpur and Patratu
	Agro-based industry: Food Processing	Gola and Dulmi
	Pisciculture	Mandu, Patratu
	Overburden to sand	Mandu
Bokaro	Solar Manufacturing and Assembly	Chas, Bermo, Chandankyari, Chandrapura
	Pisciculture	Petarwar, Kasmar
	Non-coal based MSME	Chas, Chandankyari, Bermo, Chandrapura

Recommendations

- 1. Institutionalize just transition at the sub-district level:** Jharkhand is the first state in the country to form a Just Transition Task Force for planning a strategic transition. However, to make this transition truly just and equitable, a bottom-up approach is necessary. This requires active engagement at the sub-district level, where local needs, aspirations, and challenges can be directly addressed. A long-term strategy including district just transition bodies should be formulated to work with sub-districts for focusing on identifying key sectors that can drive future growth and job creation.
- 2. Jharkhand’s task force should mobilize the state government for creating explicit just transition policies or for implementing pilot projects for economic diversification:** Our study shows that economic diversification would need nuanced planning and implementation at a large scale in coal-dependent districts. Given the central role of Jharkhand’s just transition taskforce, it should make a concerted effort towards moving the discourse from engagement to real pilot projects and policy action.
- 3. Develop infrastructure for emerging sectors identified for economic diversification:** Considering the comparative advantages at the block level, investments in terms of physical infrastructure should be made to support non-coal industries. For example, Ramgarh and Bokaro have significant potential for tourism, with abundant natural resources, cultural heritage, and historical sites. By revitalizing the hospitality industry, the districts can create new streams of income. Additionally, promotional activities like a “Tourism Week” can be organized in the districts to raise awareness and attract visitors to local tourism spots. These events can showcase the region’s unique cultural heritage, natural attractions, and local businesses, helping to boost tourism and create new economic opportunities for the community.
- 4. Foster growth of MSMEs for economic diversification:** Several non-coal

MSMEs such as those engaged in food processing, chemical manufacturing, etc. can be encouraged in the districts. This requires a focus on effective supply chains for raw materials through reliable access to locally sourced raw material, sound logistic networks and storage facilities for improving the efficiency and fostering growth of such industries. Additionally, government schemes can be leveraged for promoting such industries. For example, the Prime Minister's Employment Generation Programme can be leveraged to support the creation of micro-enterprises in sectors such as food processing, textiles, or eco-tourism.

- 5. Promote skill development and training programs in non-coal sectors:** Both Ramgarh and Bokaro are heavily dependent on coal. Such dependence has created a mono-economy around coal, where people are skilled almost exclusively for coal jobs, and have a limited skill set for non-coal sector jobs. To facilitate economic diversification away from coal dependency, it is critical to invest in skill development programs tailored to emerging sectors. Training in the solar manufacturing sector, sustainable agriculture, pisciculture, tourism, will equip the local workforce with the skills needed for new job opportunities.
- 6. Engage local communities in decision-making:** Engaging local communities in the decision-making process would be critical for the success of any economic diversification plans. By understanding the aspirations, concerns, and needs of coal-dependent workers and communities, policymakers can design solutions that are both practical and inclusive. Ongoing consultations with local stakeholders will ensure that diversification strategies align with community goals.

1.0 Introduction

Global greenhouse gas (GHG) emissions have reached record levels. The emission levels are now 54% higher than in the 1990s.¹ While urgent action is needed to limit global temperature rise to 1.5°C above pre-industrial levels, the demand for fossil fuels continues to surge. According to the latest report from the International Energy Agency (IEA), global coal demand rose to 8,687 million tons in 2023, with the largest increases coming from India and China.² Although there is current dependence on fossil fuels like coal, in the long-term a sustainable and equitable transition to renewable energy is required to meet goals outlined in the Paris Agreement.

However, any transition away from coal will have implications for coal workers, communities and dependent regions. In regions that depend on coal for jobs and income, ensuring long-term development means creating policies that encourage just transition principles and processes, and promote economic diversification.

While governments of coal-dependent countries across the globe are working for a smooth transition, India is at the forefront of this transition in the global South. Given India's growing necessity for a low-carbon transition, the government is actively working to put policies and practices in place. For example, the Ministry of Coal formed a just transition division in June 2022.³ In the same year, Coal India's subsidiaries formed just transition committees. In November 2022, Jharkhand became the first state in India to establish the Just Transition Task Force to assess and recommend steps for a planned transition in the state.⁴

Jharkhand is historically known for its coal dependency. At 108, the state has the highest number of coal mines in the country, with a total share of the national coal production of 17%.⁵ Coal mines in Jharkhand face an increased risk of abandonment or shutting down due to unprofitability and a greater push in recent years towards an economy that is not dependent on coal. The sector is responsible for employing a significant proportion of the population in the state, and communities are largely either directly or indirectly dependent on mining. The recent formation of the 'Taskforce on Sustainable Just Transition' in Jharkhand has steered the state towards streamlining a sustainable transition in alignment with India's Nationally Determined Contributions (NDCs). Given its coal legacy, the state has also garnered much interest from researchers, academicians, policy institutes, among other stakeholders.

The task force along with other studies have identified economic diversification as a crucial long-term strategy to reduce dependence on natural resources such as a single fossil fuel commodity and build resilience against future economic and environmental shocks. Although there is growing recognition of diversification as a key element of a just transition, our understanding of how it unfolds at the local level remains limited. Despite its critical importance, local-level diversification continues to be largely overlooked in existing research, leaving a significant gap in the knowledge needed to guide effective transitions.

Prior work in Jharkhand has focused on understanding the coal ecosystem and various just transition perspectives. In this context, several issues that have been studied include socio-economic impacts on unplanned mine closure, comparative analysis of Jharkhand and coal-dependent regions in South Africa⁶ and components for planning a just transition in the state.⁷ Other studies have focused on the financial

implications of the transition on the state,⁸ green budgeting⁹ and broader decadal economic strategy for the state.¹⁰ However, there remains a gap in the literature when it comes to a solution-oriented, comprehensive analysis of household and industrial coal dependencies, as well as alternative livelihood options at the sub-district level.

In this study, we aim to address the gap by conducting an innovative analysis of economic diversification prospects in two major coal-producing districts of Jharkhand—Ramgarh and Bokaro. Prior studies by institutions like the International Forum for Environment, Sustainability and Technology (iFOREST) and Climate Trends and Ernst and Young focused on Ramgarh through the lens of coal dependency, aspirations and the perception of mine closure based on household survey.⁷ In this study, we first examine the extent and nature of household and industrial coal dependency at the local district level. Next, we identify potential sectors for economic diversification and outline the approaches needed to transition these communities into these new industries.

For this study, we have chosen Ramgarh and Bokaro because they offer a strong foundation for analyzing coal dependency and identifying practical pathways for economic diversification. While both districts have historically relied on coal, Ramgarh can be described as a mono-economy centered around coal, with limited industrial development and coal production having already peaked. In contrast, Bokaro's coal mines are still expanding, and the district has long been one of the country's major industrial hubs, home to some of the oldest thermal power plants and the largest steel plant in India. By examining both districts, we can gain a more nuanced understanding of coal dependency and economic diversification, providing a diverse perspective on potential pathways for a just transition.

In the next section (2.0) we explain our research objectives and methods. In section 3.0 we detail out the results of the field-based analysis. For each district, we describe the nature of coal dependency in the locality, and the prospects for diversification. In the last section (4.0), we discuss our work in the context of economic diversification pathways in Jharkhand and provide actionable recommendations.

2.0 Research questions and methodology

Research questions

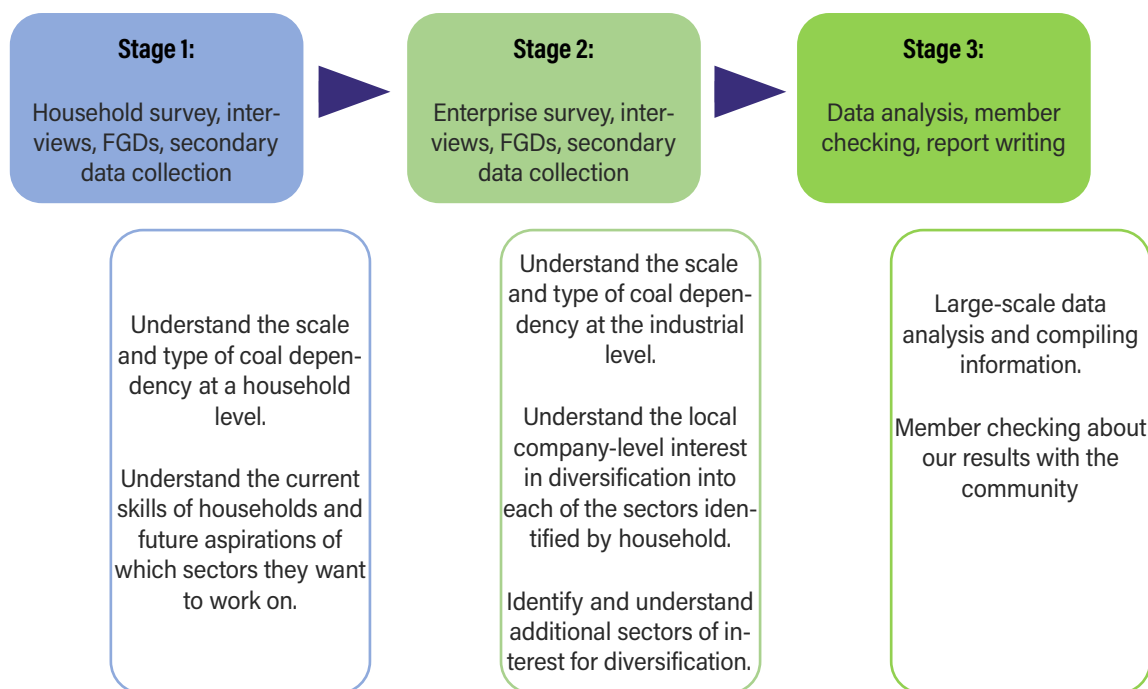
In this study, we ask the following research questions:

1. What is the scale and type of economic dependency on the coal sector at a district level?
2. What are the aspirational sectors for economic growth that local coal-dependent regions can diversify into?

The study is completed in different phases, which includes quantitative households and enterprise surveys, qualitative surveys, data analysis, policy analysis and member check-in.

Figure 1: Stages of research

The research for this study was conducted in distinct stages. These stages involved data collection, analysis, and writing. Additionally, we attempted to disseminate the study's findings at the ground level.



2.1 Household surveys

We conducted household surveys to understand coal dependency, people's skills, and their aspirations to find work in future sectors. Before starting the actual survey, we conducted pilot studies in Ramgarh. In the pilot, we surveyed 100 households in urban and rural non-sampled locations. Based on the responses during the pilot, we revamped the questionnaire and altered the language of several questions and associated options for better understanding.

The survey questions are divided into five parts: a) Demographic, b) Employment, c) Social infrastructure, d) Aspiration, and e) Digital access.

The questionnaire was redesigned into an online data collection software - surveyman. The digital data collection helps to minimize the skip error and also captures the geo-coordinates of the sampled households.

Sampling for the household survey

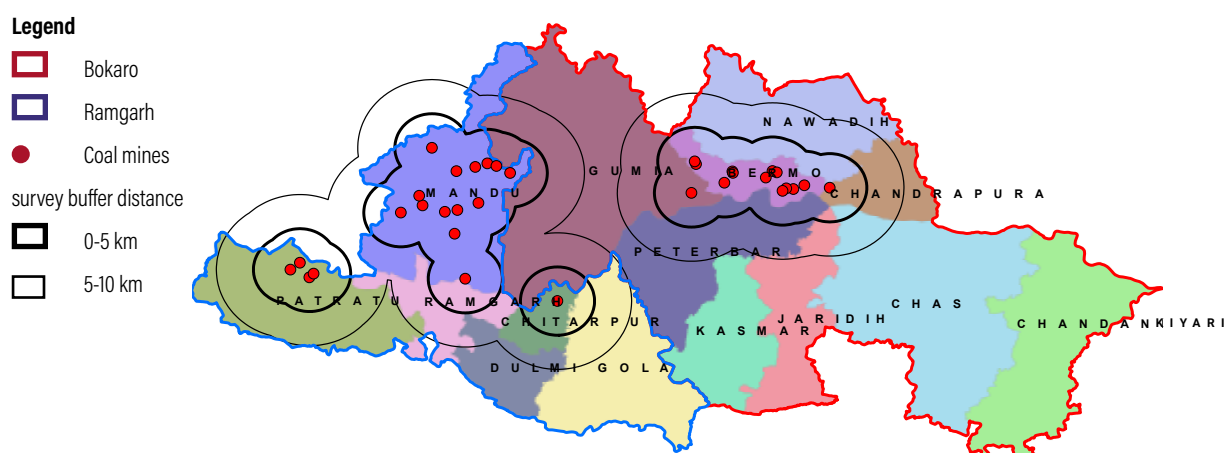
We employed a spatially random stratified sampling method for the household survey at 95% confidence level and 2% margin of error to ensure a representative distribution across different geographic areas and population subgroups. This approach divides the villages into distinct strata or segments, which are then sampled randomly within each stratum. By doing so, we account for potential variations within the population and improve the precision of the survey results.

For selecting the sample points within a district, three strata were applied:

- 1. Distance-wise buffer:** Three buffers are created around the mines: 0-5 km, 5-10 km, and beyond 10 km, making it the first strata. Once the buffer is created, GIS tools are used to calculate the population within each buffer.
- 2. Type of locality (urban/rural):** For each buffer area, we further classify the region into urban and rural zones based on the 2011 census classification, creating a second layer of stratification.
- 3. Scheduled caste/tribe population:** The villages in the district are homogeneous in terms of population and household characteristics. To mitigate potential sampling bias, wards and villages were categorized according to the predominant community type, with each category ensuring proportional representation at a 20% allocation. This created a third layer of stratification.

Map 1: Sampling for household survey in Ramgarh and Bokaro

Block-wise sampling of households was carried out by creating buffer zones around the mine clusters, categorized as 0–5 km, 5–10 km, and beyond 10 km. Within each buffer zone, households were selected based on a combination of urban-rural classification and local demographic factors.



The households were randomly selected to overcome sampling bias. In each sampled locality, every 10th household was surveyed and the left-hand rule was followed, which is to say that from the starting point of the villages, every tenth household from the left was surveyed. This is a standard sampling technique and has been used extensively by scholars in past studies.¹¹

The village sample is drawn as per the proportion of the district population using the STATA software. In each rural sample point, 15 households were surveyed, while in the urban localities, 25 households were surveyed.

Table 2: District and buffer-wise sample in Bokaro and Ramgarh

The table presents the final number of households selected from both rural and urban areas within the buffer zones in each district.

District	0-5 Km		5-10 Km		10+ Km		Total
	Urban	Rural	Urban	Rural	Urban	Rural	
Bokaro	286	120	23	59	154	308	950
Ramgarh	225	108	238	161	20	131	883

During data collection, the data quality was monitored using multiple tools including spot check, high-frequency check and back check. The inputs from the data quality check were shared by the surveyors and discussed on debriefing calls, improving the quality of the surveys.

2.2 Enterprise survey

We conducted a first-of-its-kind enterprise survey in the two districts.

The survey questions are divided into five sections: 1) General; 2) Institution; 3) Finance; 4) Infrastructure; and, 5) Labour and human resources. Each of these sections assess the industrial coal dependency and diversification potentials of registered and unregistered enterprises.

Registered enterprise

For the registered enterprises, we use stratified random sampling using three strata:

- 1. Size of the district economy:** Following the World Bank (WB) methodology for enterprise surveys, we determined the number of registered firms to include in the sample. Since the Gross District Domestic Product (GDDP) of both districts is below USD 20 billion (INR 1,727.66 billion)¹², a sample size of 150 to 170 registered firms was chosen, in line with the standard for WB surveys.¹³ Additionally, to better understand the informal economy surrounding the coal sector, 60 unregistered enterprises were surveyed in each district.
- 2. Sector classification(primary, secondary and tertiary):** Each industry sector is further divided into coal and non-coal categories, based on their direct or indirect reliance on coal and the use of coal-based boilers. For example, businesses involved in coal mining are classified under the primary coal sector, while agriculture and forest-based industries are categorized in the pri-

mary non-coal sector. Similarly, coal transport falls under the tertiary coal sector, while non-coal transport and other services are placed in the tertiary non-coal sector. The distinction between coal and non-coal manufacturing sectors is based on whether the enterprise uses coal-based boilers or depends on coal as a raw material in production.

Table 3: Sector and firm-wise sample for Ramgarh

The table presents the number of registered enterprises surveyed in Ramgarh, categorized by sector into coal-related and non-coal enterprises. The classification is based on their involvement in coal mining activities like coal transport, coal fly-ash brick production or the use of coal-based boilers in manufacturing.

Sector	Total units covered	Sample in each sub-sector	Small (5-20 employees)	Medium (20-100 employees)	Large (100+ employees)
Primary coal	46	16	4	8	4
Primary non-coal		30	11	12	7
Secondary coal	55	37	7	15	15
Secondary non-coal		18	6	9	3
Tertiary coal	69	30	11	9	10
Tertiary non-coal		39	20	14	5
Total	170				

Table 4: Sector and firm-wise sample for Bokaro

The table presents the number of registered enterprises surveyed in Bokaro, categorized by sector into coal-related and non-coal enterprises. The classification is based on their involvement in coal mining activities like coal transport, coal fly-ash brick production or the use of coal-based boilers in manufacturing.

Sector	Total units covered	Sample in each sub-sector	Small (5-20 employees)	Medium (20-100 employees)	Large (100+ employees)
Primary coal	17	3	0	3	0
Primary non-coal		14	5	5	5
Secondary coal	66	28	6	14	6
Secondary non-coal		38	20	17	20
Tertiary coal	67	20	7	11	7
Tertiary non-coal		47	34	13	34
Total	150				

- Firm size:** Each unit is classified into small, medium and large based on the number of people employed. The classification is created based on the list of industries, nature of employment and expert consultation. Small enterprises employ below 20 workers, medium 20-100 workers, and large above 100 workers. The classification is based on the type of industry and the number of

employees in the different enterprises in the districts.

Based on this criteria, the registered units are sampled and three screening questions are asked to eliminate non-eligible enterprises, these questions include:

1. If the firm is registered with a registration agency;
2. If the firm is privately owned (not fully-owned by the government or municipality);
3. If the firm has 5 or more workers.

Registered enterprises that qualify these screening questions were surveyed using the questionnaire on the 'surveyman' application.

Table 4: Sector and firm-wise sample for Bokaro

The table presents the number of registered enterprises surveyed in Bokaro, categorized by sector into coal-related and non-coal enterprises. The classification is based on their involvement in coal mining activities like coal transport, coal fly-ash brick production or the use of coal-based boilers in manufacturing.

Sector	Total units covered	Sample in each sub-sector	Small (5-20 employees)	Medium (20-100 employees)	Large (100+ employees)
Primary coal	17	3	0	3	0
Primary non-coal		14	5	5	5
Secondary coal	66	28	6	14	6
Secondary non-coal		38	20	17	20
Tertiary coal	67	20	7	11	7
Tertiary non-coal		47	34	13	34
Total	150				

Unregistered enterprise

Unregistered enterprises refer to those businesses that are involved in manufacturing activities or provide/render services but have not registered permanently with the relevant authorities, or have failed to file an EM-II (Entrepreneurs Memorandum) with the District Industries Centre (DIC) on or before the stipulated date of March 31, 2007.¹⁴

In each of the districts, 60 to 65 unregistered enterprises were surveyed using single-stage cluster sampling. The selected locations were the primary market areas in both districts, where unregistered businesses were more likely to be found. These markets were chosen based on their role as the main economic hubs of the districts and because they are places where unregistered businesses are actively involved in daily operations. In Ramgarh, six market areas—Bhurkunda, Chittarpur, Kujju, Rajrapa, Gola and Patratu—were selected and an equal number of sample enterprises were randomly selected from each market area. Similarly, in Bokaro, four market areas were selected, namely, Chas, Kargali Bazar, Peterwar and Chandankiyari.

Unregistered enterprises are one of the main contributors of the induced impact of coal on local economies. The questionnaire for the unregistered units was similar to that for the registered one. It did not include technical jargon to facilitate ease of communication.

2.3 Focus group discussions and interviews

Qualitative surveys are essential for interpreting the results of the quantitative survey and gaining a more thorough understanding of the nuances of coal dependence and diversification. Our qualitative research was collectively done for the household and enterprise surveys. We conducted 12 focus group discussions (FGDs) with coal communities, local businesses, and coal workers, among other stakeholders.¹⁵ In addition, we conducted 10 semi-structured interviews with the district administration, and with coal officials in each of the districts. The number of participants for the FGDs ranged between 8 and 12, with a moderator and a note-taker. The FGDs were recorded, transcribed and organized into themes (coal dependency and diversification potentials) for analysis.

2.4 Additional data collection

In addition to qualitative and quantitative data collection, we procured secondary data from the district administration, state government and coal companies. Data for coal production, lease area and other mining data were collected from coal companies. Similarly, data on socio-economic indicators like health, education, and water supplies was collected from the district administration. The list of industries was collected from District Industries Centre, the local chamber of commerce and MSME-DC, Ranchi.

2.5 Data quality control

In order to ensure the data quality of the highest order, both during the surveys and after, survey data quality protocols were deployed. The data control methods for household and enterprise surveys differ slightly, with the main distinction being in the back-checking process. In the case of the enterprise survey, it was not feasible to schedule multiple appointments with business owners due to their availability and time constraints, so back-checking was not conducted for this survey.

The following methods were employed in the survey for quality control of the surveys :

- 1. Spot check:** The field team conducted a spot check daily in each district. The team would visit 2-3 survey locations each day in each district to ensure that data entry was properly monitored. The observation from the spot check was communicated to the whole team on a daily basis.
- 2. High-frequency check:** During the data collection phase, we conducted daily high-frequency checks on key indicators that were prone to errors or sensitive to questionnaire design. These checks focused on the flow of the questionnaire, sample locations, and any patterns in the data collection process that could negatively affect data quality. Additionally, statistical analysis

was performed to identify any extreme values or outliers in the data, ensuring its accuracy and reliability.

3. **Debriefing with surveyor:** Daily debriefing calls were conducted with surveyors during the data collection process. This was done to understand any field difficulties and to share with them key data insights obtained from data analysis. In the later phase of the survey, two calls per week were scheduled to share field observations and insights. The objective of this exercise was to rectify any errors on a daily basis.
4. **Backcheck:** During household surveys, 10% of the surveys were backchecked by the research and field team. Based on the backcheck findings, retraining was given to a few surveyors, and a few forms were rejected and taken out from the analysis. Those households were surveyed again to maintain data quality and achieve the required sample. The backchecks were done only for the household survey, as appointments with business owners were not available.

2.6 Data analysis

The data analysis was conducted after thorough data cleaning and management using STATA and Excel. During the analysis, we generated descriptive statistics to provide an overview of key trends and patterns across the dataset. These statistics helped us capture a wide range of household and industrial characteristics, particularly focusing on dependency on coal and the potential for diversification at both household and industry levels. We analysed coal dependencies on various aspects including, employment, social infrastructure (including primary cooking fuel sources), and fiscal dependency. Additionally, we assessed the potential for diversification in terms of new sectors, livelihood alternatives and aspirations for children to work in other sectors.

For industrial enterprises, we assessed the challenges and opportunities related to diversification by examining key factors such as institutional support, skilled labour availability, infrastructure availability, and access to finance. This helped us understand the readiness of industries to innovate or transition to new sectors, as well as the barriers they face in moving away from coal.

2.7 Limitations

The survey was designed and conducted in the most scientific and comprehensive manner. In doing the sampling and before starting the survey, the field team completed a recce. Considering the nature of the research, there were a few limitations:

- **Lack of recent survey data:** To calculate the sample size, we used the 2011 census figures, which were extrapolated at an annual growth rate of 1.1%. While this extrapolation provides an estimate for the current population at the district level, the absence of updated population estimates means that the proportion of each stratum is assumed to have remained similar to the 2011 data. Consequently, while the extrapolated numbers offer a reasonable

approximation, they may not fully capture any shifts in population distribution or demographic changes that may have occurred since the last census.

- **Entry barriers to the officers' colony:** Accessing officials for the household survey was challenging due to restricted entry into the colony. To overcome this, we leveraged local contacts whenever possible and conducted qualitative surveys with CCL officials.
- **Inclusion of select topics:** Our study focuses only on coal dependency and diversification to ensure a more targeted and in-depth analysis, given the limitations of resources and time. Other relevant topics were not covered. For example, while land issues and the political economy of coal are undeniably important aspects of the broader context, they fell outside the specific objectives of this research.

3.0 Results

In this section we delineate our survey results. This section is divided in three parts: 1) Household and industrial profiling; 2) Coal dependency; and, 3) Diversification potential. Additionally, we substantiate our survey findings with qualitative inputs from the focused group discussions and interviews.

3.1 Ramgarh

Ramgarh is a historic coal district of Jharkhand with a gross district domestic product (GDDP) of USD 1.2 billion (INR 102 billion), contributing 3.4% of Jharkhand's GDP.¹² With 15 coal mines operated by a subsidiary of the state-owned enterprise Coal India Limited (CIL), Central Coalfields Limited (CCL)¹⁶. The current coal production in the district is 11.23 million tons (2023-24).⁵ A joint venture between federal government-owned NTPC Limited and Jharkhand's state electricity board is slated to commission a new supercritical 4 gigawatt coal-fired power plant in the district, located in the district's Patratu administrative block.¹⁷

Table 5 : List of coal mines in Ramgarh

The table provides details of the operational coal mines in Ramgarh, including total land area, project capacity, mineable reserves, and total production as of 2023.

Name of the mine	Total land (Ha)	Project Capacity (MTPA)	Total Mineable Reserves as on 01.04.22 (MT)	Total Production in 2023-24 (MT)
Rajrappa OC	2263.83	3	73.86	1.30
Bhurkunda OC*	910.16	2.05	5.98	0.14
Saunda UG*	N/A			0.00
Sayal D OC	410.08	5	27.94	1.01
Sirka OC	93.87	1.5	36.67	0.12
Urimari OC	240.1	2	7.54	0.79
Gidi A	240	0.6	56.2	0.49
Gidi C	6.7	0.6	12.62	0.60
Sarubera/Chainpur OC	334.97	1	10.34	0.00
Ara OC	123.48	0.76	19.53	0.00
Karma OC	244.04	1	7.98	0.86
Pundi OC	774.26	5	117.77	0.00
Topa OC	547	1.2	34.33	0.82
Patratu ABC UG	2067.82	5	162.37	
West Bokaro	1740*	9		5.10

Source: Data collected from the CCL HQ and for West Bokaro mines data obtained from Tata Steel Annual Report 2023-24¹⁷ https://environmentclearance.nic.in/writereaddata/Online/EDS/0_0_16_Apr_2022_1708506001ADSBhurkundaColliery.pdf

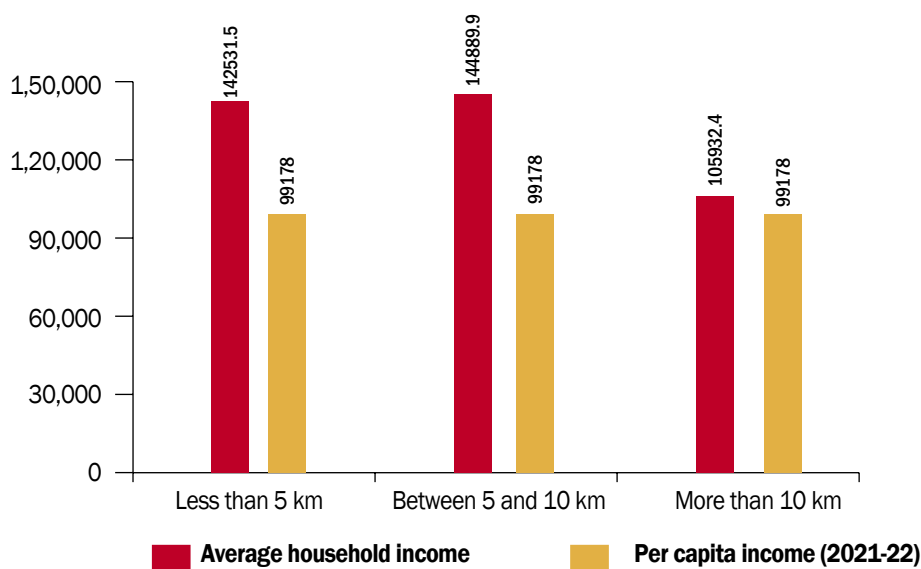
*Project report not available; data obtained (if applicable) from EC letters.

Household Profile of Ramgarh

Based on our survey, the average household size in Ramgarh is 4.8, which is small compared to the 2011 census estimate of 5.3. The average household yearly income is approximately USD 1,643 (INR 1,39,655). This is slightly higher than the estimated per capita income of USD 1,188 (INR 1,00,980) (2021-22)¹².

In our survey, 69% of the respondents were males. The father or father-in-law is the main decision maker in 12% of the households within 0 to 5 kms; and only 4% of households beyond a 10-kilometre radius of the coal mines.

Figure 2: Ramgarh’s per capita income (2021-22) and average household income as per the survey



Source: PCI according to the Jharkhand GDDP report (2021-22)

Ramgarh is well endowed with agriculture and forest land. Around 24% of the total area in the district is agricultural land.¹⁹ Based on our survey, 19% of the respondents’ families migrated to Ramgarh to practice agriculture while 5% of respondents migrated to secure employment in the coal sector. In terms of the type of houses, 82% of the respondents live in pucca or semi-pucca households. While 90% of the respondents own the houses they live in, 3% of the respondents in total live in facilities provided by the coal companies. The number of people staying in the CCL accommodation is almost double in the 0 to 5 km radius.

In 2023, 18% of Ramgarh’s population is estimated to be multidimensionally poor.²⁰ In our survey, 32% of households are priority household card holders, 20% are Antyodaya Anna Yojana ration card holders, while 24% are red card holders. As many as 81% of these households lie in the 0-5 km and 5-10 km radius zones.

In terms of digital service accessibility, 59% of households have at least one member with a smartphone. Eighty-six percent of these households know how to operate a smartphone at the basic level. As for affordability, 69% of the households who avail the services find the digital service centers in Ramgarh affordable.

Industrial profile of Ramgarh

We surveyed 170 registered enterprises in Ramgarh in all six blocks of the district. The sample had 69% industries from rural areas, while 31% were from urban areas. The main respondent was the owner or a project manager or another official in top management, with an average work experience of 12 years. Only 10% of the sample enterprises had women owners. We covered enterprises that began operations as early as

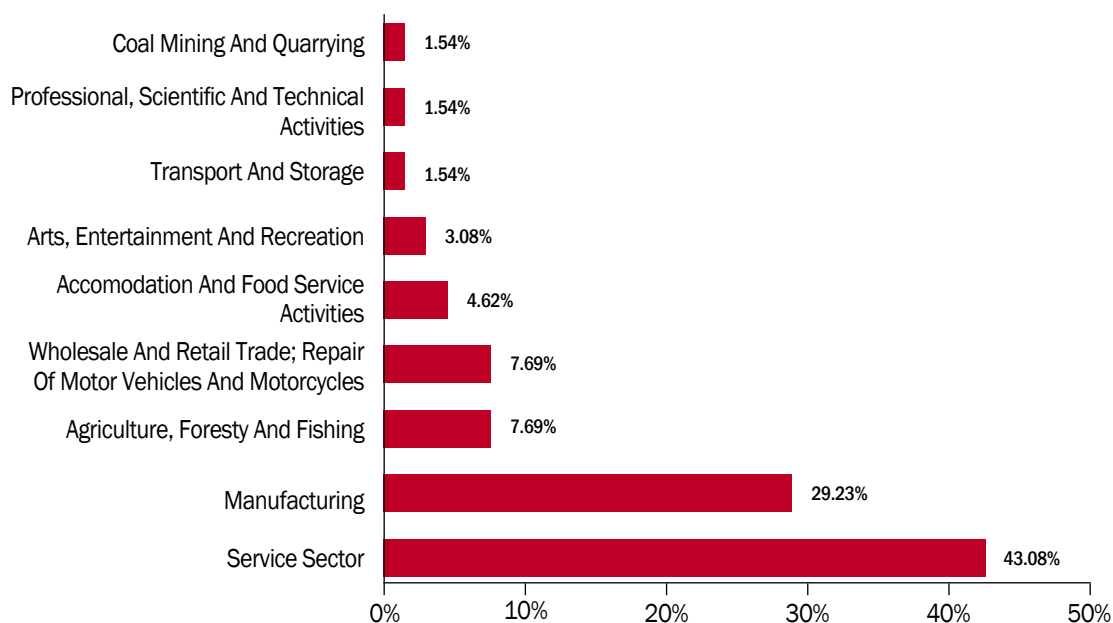
1954 and as late as 2023. As for legal status, 51% of the sample enterprises are sole proprietorship, while 22% are partnerships.

Table 6: Block-wise registered units covered in Ramgarh

Block Name	Sector						Total
	Primary coal	Primary non-coal	Secondary coal	Secondary non-coal	Tertiary coal	Tertiary non-coal	
Chittarpur	11	0	1	5	12	5	34
Dulmi	0	9	4	0	0	1	14
Gola	0	7	0	2	0	16	25
Mandu	0	0	14	4	13	2	33
Patratu	0	10	8	4	0	0	22
Ramgarh	5	4	10	3	5	15	42
Total	16	30	37	18	30	39	170

Figure 3 : Sector-wise sampled unregistered units in Ramgarh

The table presents the sector-wise distribution of unregistered enterprises surveyed in Ramgarh. The majority of the enterprises were engaged in the service and manufacturing sectors.



For the unregistered enterprises, we covered 65 units in the market areas of Bhurkunda, Chittarpur, Kujju, Rajrappa, Gola, and Patratu. The majority of these units (43%) were in the small-scale service sector, followed by manufacturing (29.3%), agriculture and allied activities (7.6%), and wholesale and retail trade (7.6%).

3.1.1 Coal dependency in Ramgarh

Coal dependency in the district manifests in various forms, including employment, infrastructure, and local revenue reliance. A 2020 study by iFOREST in Ramgarh provided a broader understanding of coal mining within the context of Jharkhand's just transition. ⁷ Their research indicated that one-fourth of households in Ramgarh were dependent on coal. Our figures show approximately 8.8% are directly involved in coal

mining. However, our analysis reveals a greater degree of coal dependency within local enterprises, an aspect that had not been explored in previous studies.

Livelihood

Households in Ramgarh are coal dependent for employment and livelihood in three key ways:

1. Direct: Employment in coal mines as departmental or contractual workers.
2. Indirect: Employment in ancillary industries that use coal, such as thermal power plants, brick kilns, coal transportation, etc.
3. Induced: Households engaged in business depend on the coal sector in two ways:
 - i. Providing services to the coal sector in a business-to-business (B2B) set-up, and;
 - ii. Providing services to individual customers (B2C) who are employed in the coal sector.

Table 7 : Wage Payment to direct CCL employees for 2023-24 in Ramgarh

The table presents the wage payment CCL made to the people directly employed on their payroll. The table gives the estimate of contribution CCL workers made to the local economy

Item	Amount in (INR)	Amount (USD)
Salary, Wage Allowance etc (Crore/Million)	5240.02	616.47
Contribution to PF and Other Fund (Crore/Million)	746.85	87.86
Gratuity (Crore/Million)	141.51	16.65
Leave Encashment (Crore/Million)	308.82	36.33
Others (Crore/Million)	425.6	50.07
Total Employee benefit (Crore/Million)	6862.8	807.39
Total Workforce in CCL (Number)	34483	NA
Total Workforce working in Ramgarh (Number)	10968	NA
For Induced Economy Calculation		
Salary, Wage Allowance etc	5240.02	616.47
Average per Employee wage in CCL	1519589.36	17877.52
Total Wage payment by CCL in Ramgarh (Crore/Million)	1666.6	196.07

Assumption: For expenditure in the local economy only Salary wage is taken into consideration

Note: Wage payment to the Coal miner working on TATA Steel payroll is not considered as wage payment to outsourcing or contractual workers are not considered in this calculation.

Source: CCL Annual Report 2023-24

In Ramgarh, 10,968 workers are directly employed in the Central Coalfield Limited a subsidiary of Coal India Limited.²¹ Based on our survey, 8.8% of the households are directly employed in coal mining in different capacities. Apart from these direct

jobs, around 4,000 workers are involved with companies providing services to coal companies such as cleaning, sprinkler systems, etc.¹⁵

Wage payments made to coal workers have a significant multiplier effect on the local economy, as most of this money is spent locally within the community. In Ramgarh, based on our estimation (Table 7), CCL disburses approximately INR 1,666.7 crore (USD 196.07 million) in wages to its direct payroll workers. These wages contribute to stimulating the local economy by supporting consumption. Given the multilayered nature of the coal economy, our analysis—based on a combination of qualitative, quantitative and secondary data—estimates that beyond the direct and indirect workforce employed by the coal sector, approximately 100 thousand workers and residents rely on the coal-induced economy, including coal transport workers, maintenance staff, and local vendors such as grocers near the mines and the coal companies colony or township.²² They are largely supported by the spending power of coal workers.

Figure 4: Type of coal dependency in registered enterprises in Ramgarh

Industrial coal dependency in Ramgarh includes enterprises that supply equipment or machinery to coal mines and thermal power plants, provide transport services within the coal mines, or contribute to the induced economy by having the majority of their customers working in the coal sector.

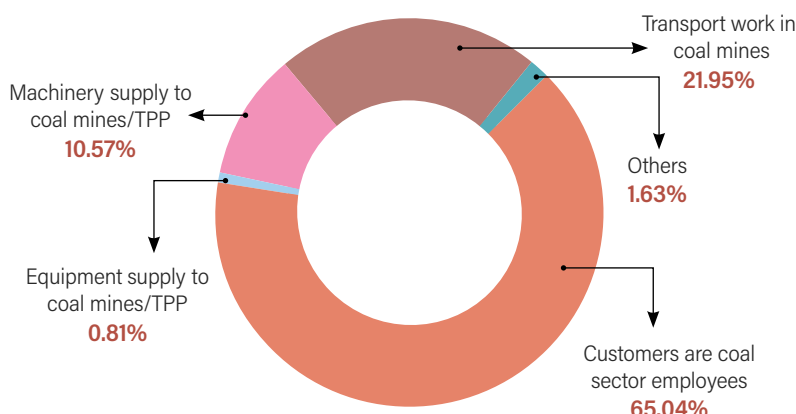
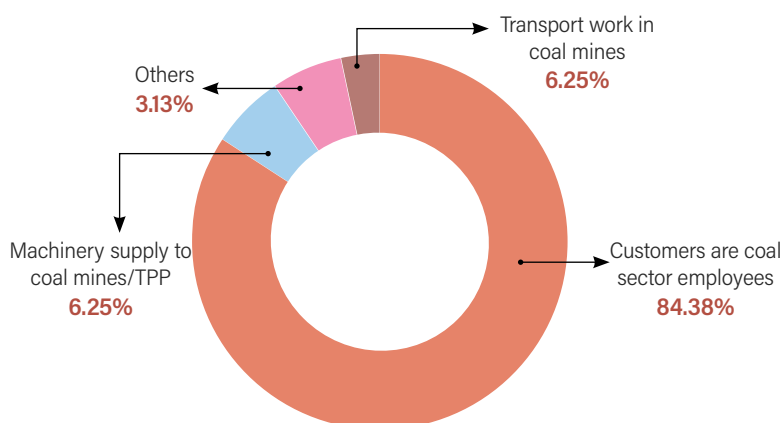


Figure 5: Type of coal dependency in unregistered enterprises in Ramgarh

Industrial coal dependency among unregistered enterprises in Ramgarh includes businesses that supply equipment or machinery to coal mines and thermal power plants, provide transport services within the coal mines, or support the induced economy by primarily serving coal-related industries.



Like many old coal mining areas in India, hundreds of thousands of people in Ramgarh are involved in informal coal scavenging (illegal by law) for either self use or selling in the open market.

Based on the unregistered survey, 48% of the enterprises are dependent on the coal sector. Within this, 85% of the enterprises depend on coal sector employees for their business, 6% supply machinery to coal mines and thermal power plants, and another 6% work in the coal transport sector. Additionally, 31% of these enterprises use coal-based boilers. The majority of these enterprises (55%) procure coal from the local markets, while 45% self-procure it from coal mines.

Apart from households, industrial coal dependency is based on direct or indirect reliance on coal for business and usage of coal-based boilers. Based on our survey, 72% of the registered units in Ramgarh are dependent on the coal sector. In other words, Ramgarh's industries are deeply dependent on coal. Of this, 7.6% of enterprises supply machinery to coal mines and thermal power plants, while 15.8% are involved in coal transportation. The use of coal-based boilers is restricted to the manufacturing sector. Within manufacturing, 25% of registered enterprises use such boilers. In the event of non-availability of coal, while 1% enterprises prefer switching to electricity, 24% of the enterprises perceive that there is no alternative to coal-based boilers. Overall, 88% of these enterprises are aware that coal demand will decline in the future.

Infrastructure support

A key dependency on the coal sector is assessed in terms of social infrastructure in the district. Coal companies play a pivotal role in providing housing facilities, health and educational facilities, and utilities like electricity and water supply. Infrastructure is supported within 25 kms of the mines through formal and informal arrangements. Coal is also a major source of cooking fuel for households near the mines.

We assess these dependencies based on the proportion of households availing these services.

Housing

In our survey, 3% of the respondents in Ramgarh live in CCL or coal company-supported housing colonies within 0-5 km and 5-10km of the mines. Beyond 10 kms, no respondents in the survey live in coal colonies. Anecdotal evidence and qualitative surveys suggest that apart from current coal employees, retired coal company officials reside in the colonies. Abandoned colonies are sometimes illegally occupied. Out of the 26,897 quarters allotted by CCL in Ramgarh as of 2022, approximately 11,744 or 43.6% of the quarters are occupied by unauthorized persons.²³

Overall, coal mine closures might impact housing in two ways. First, mine closures can lead to reduced funds for colony maintenance and upkeep, thereby causing deterioration of the facilities. Consequently, some residents might be able to shift to better locations within the city and abandon their present housing. In our survey, 6% of the respondents within 10 km witnessed colony maintenance being adversely affected due to past coal mine closures. Similarly, 5% assert that the colonies were

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The coal industry creates an induced economy, where each coal employee supports the livelihoods of 20 people”

Focus Group Discussion with Trade union leaders in Ramgarh

abandoned. Overall, housing facilities for 37% of the households will be impacted by future closure of coal mines.

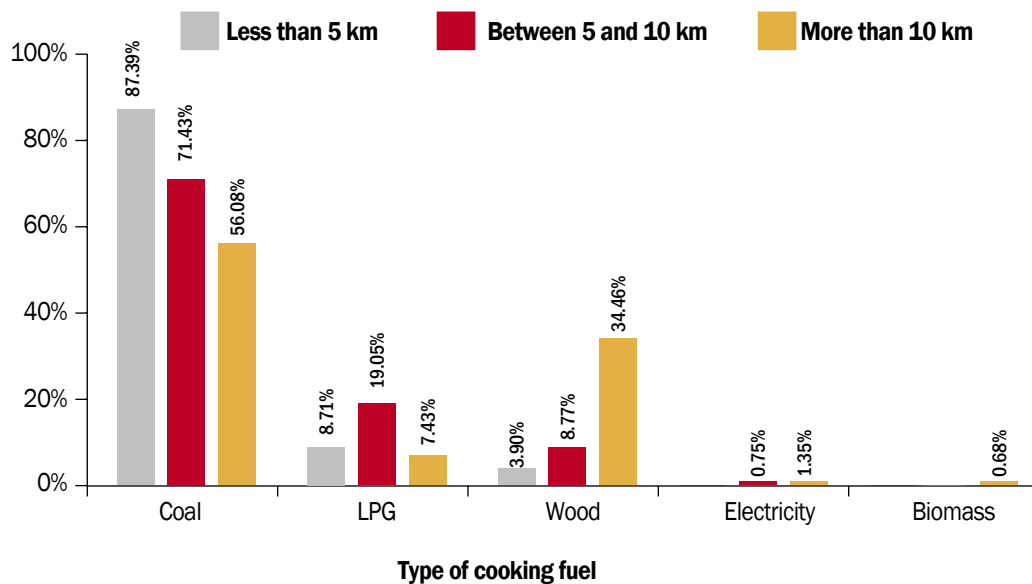
Cooking fuel

Locally sourced coal serves as the primary cooking fuel in the district. Within 0-5 km of the mines, 9 out of 10 households (87% in total) rely on coal for cooking. The dependence on coal decreases with distance: 71% of households use coal within 5-10 km, and 55% do so beyond 10 km. Overall, coal remains a dominant cooking fuel in the district, a trend that aligns with anecdotal evidence from the field. Other cooking fuel sources include LPG, wood, and electricity. One study by iFOREST found that coal use as the primary cooking fuel was somewhat lower than our analysis indicates, with 52% of the households surveyed relying on it. In their study, at the district level, 67% of the households are dependent on coal for the primary cooking fuel. Our findings show a higher reliance on coal for fuel, underscoring its significant role in the local energy mix.

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Figure 6: Type of cooking fuel used in Ramgarh

The majority of households across all three buffers use coal as their primary cooking fuel. The use of other fuel options, such as LPG, wood, electricity, and biomass, is minimal.



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80% of the households use locally procured coal as cooking fuel, while 20% use LPG”

Focus Group Discussions with Informal coal workers in Ramgarh

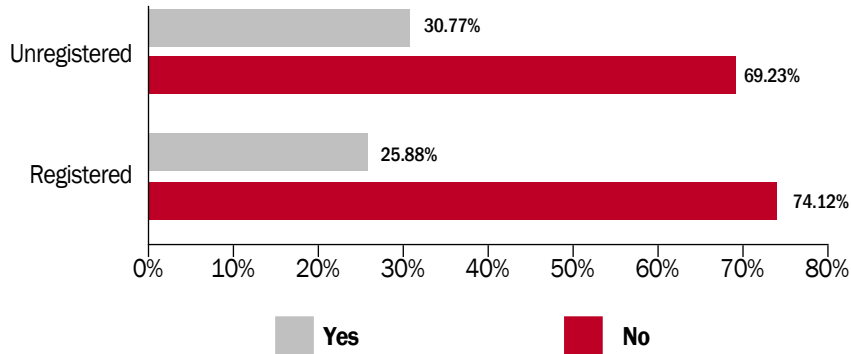
For households dependent on coal, 99.5% either procure it from cycle sellers or self-procure it from the mines. Our focus group discussion with informal coal workers also attests to this dependency.

Coal is used as primary cooking fuel for the most part for being easily accessible and cheaper compared to other available sources. Our survey denotes that households de-

pendent on coal spend USD 10.5 (INR 893) per month on cooking fuel, while non-coal users spend USD 13.1 (INR 1,114). In this context, the informal economy plays an important role in the supply of coal. The cycle-wallahs procure coal from mines and sell it to local shopkeepers.

Figure 7: Industrial use of coal-based boilers in Ramgarh

The figure illustrates the proportion of registered and unregistered enterprises that use coal-based boilers in their manufacturing processes. The use of coal-based boilers among these enterprises is relatively low

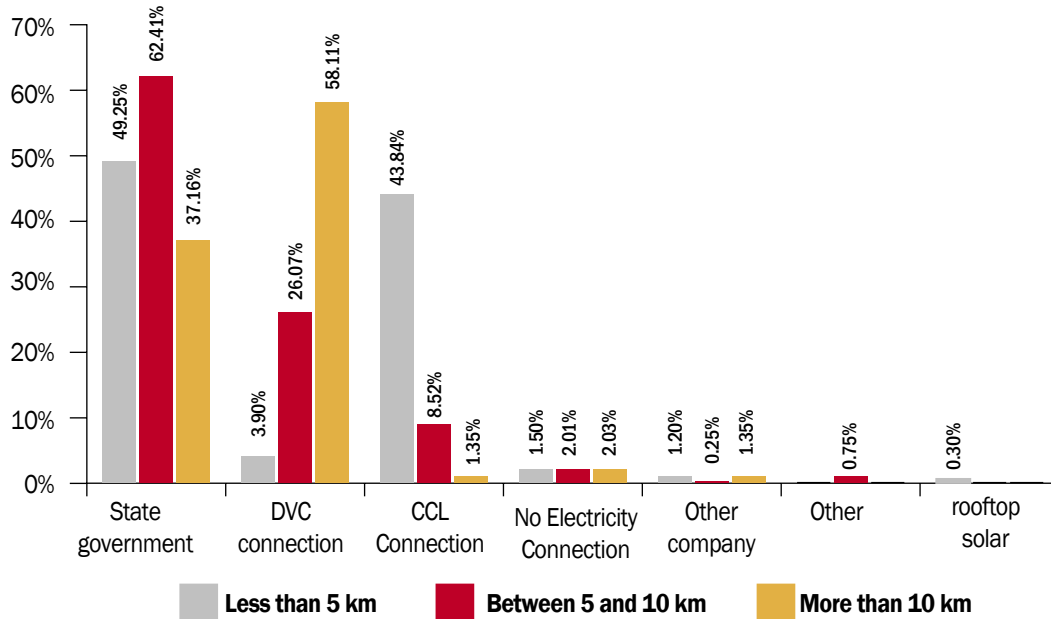


Electricity and water supply

Our estimates suggest that 53% of the households are dependent on the state supply of electricity. However, within 0-5 kms of the mines, 89% households avail an electricity connection provided by CCL. CCL provides grid-connected electricity to these people and also incurs the cost of electricity consumption.

Figure 8: Number of households with type of electricity connection in Ramgarh

The figure shows the sources of electricity in Ramgarh. While most households across all three buffers receive electricity from state connections, CCL-supplied electricity is primarily available in the 0–5 km buffer.



Based on our survey, 23% of the registered enterprises use CCL electricity con-

nection. While the majority of these enterprises use the state government connection for electricity, only 3% of these industries have captive connections. Although unregistered enterprises also majorly use state government connection, their dependence on CCL connection is slightly higher than the registered enterprises.

Figure 9: Electricity source for enterprises in Ramgarh

The figure illustrates the sources of electricity for enterprises in Ramgarh. The majority of both registered and unregistered enterprises receive state-supplied electricity, followed by CCL-supplied electricity. Captive electricity connections are minimal.

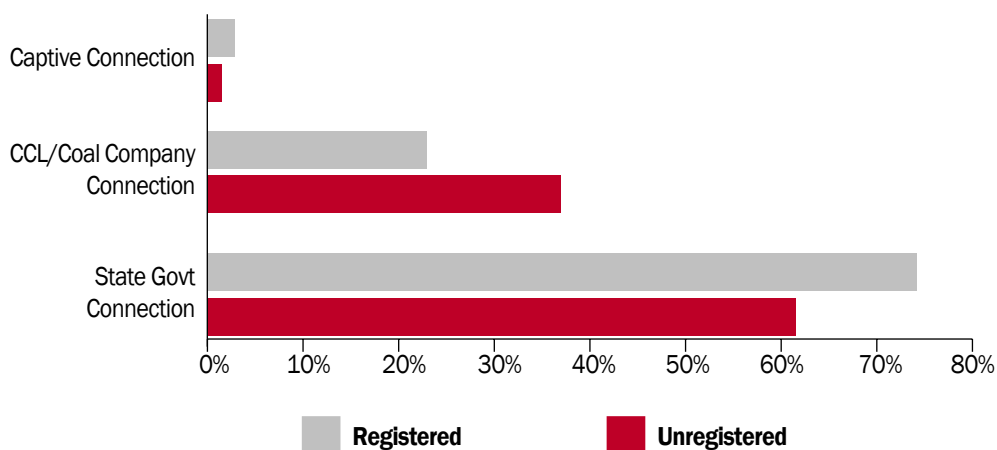
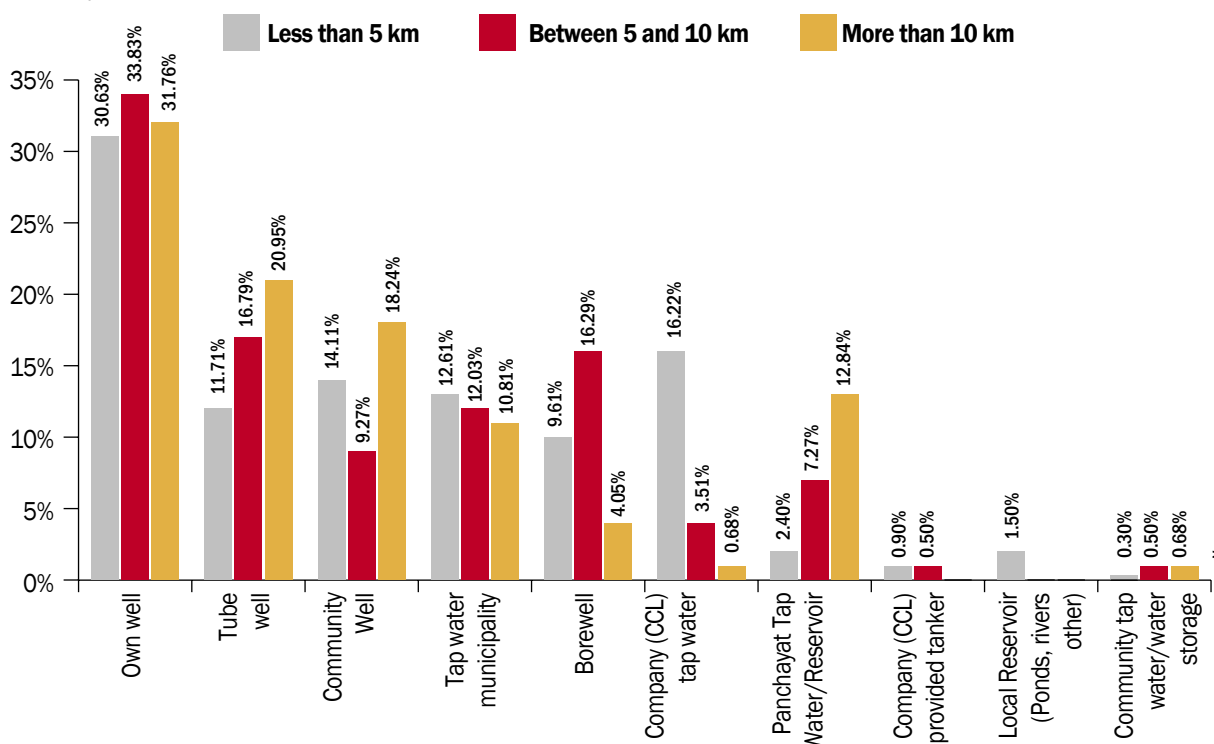


Figure 10: Sources of water supply for households in Ramgarh

The figure shows the sources of water for households. The majority of households across all buffers rely on wells and taps for their water supply. CCL water connections are predominantly used by households in the 0 to 5 km buffer.

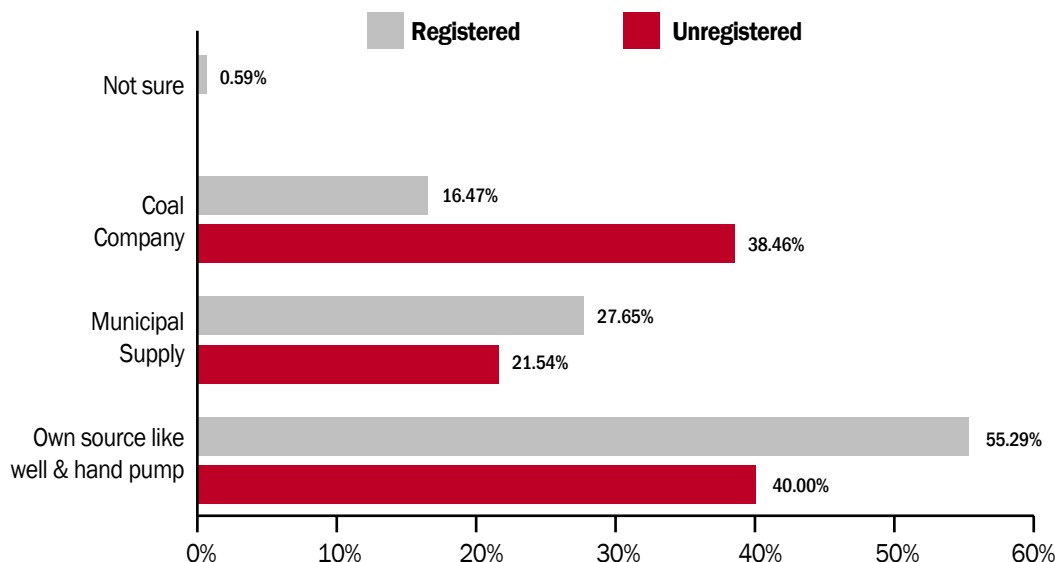


In terms of industrial water supply, both registered and unregistered enterprises rely on their own sources like wells and handpumps. Additionally, 38% of the unregistered enterprises source water from CCL connections. Dependence on municipal

supply for water is greater for registered enterprises.

Figure 11: Sources of water supply for enterprises in Ramgarh

The figure illustrates the water sources for enterprises. Wells and hand pumps are the primary sources of water for most enterprises. Water supplied by coal companies is predominantly used by unregistered enterprises.



Central Coalfield Limited under its welfare measures provides water supply to its commanding area and areas falling under its CSR purview. The company provides 14.30 MGD treated water in these areas.²⁴ The survey found that 32% of households rely on their own wells as a primary source of water. Other common water sources include tubewells, borewells, community wells, and tap water. Water supplied by CCL is most prevalent within a 0-5 km radius of the mines, serving approximately 16% of households in this area. This supply decreases significantly with distance, with only 4% of households within the 5-10 km buffer, and just 0.68% beyond 10 km.

Health and educational facilities

Coal companies support health facilities including hospitals and medical insurance. Overall CCL currently runs 13 hospitals and 34 dispensaries with a total of 194 doctors.²⁵ As per interviews, CCL-run hospitals cater to non-employees as well.

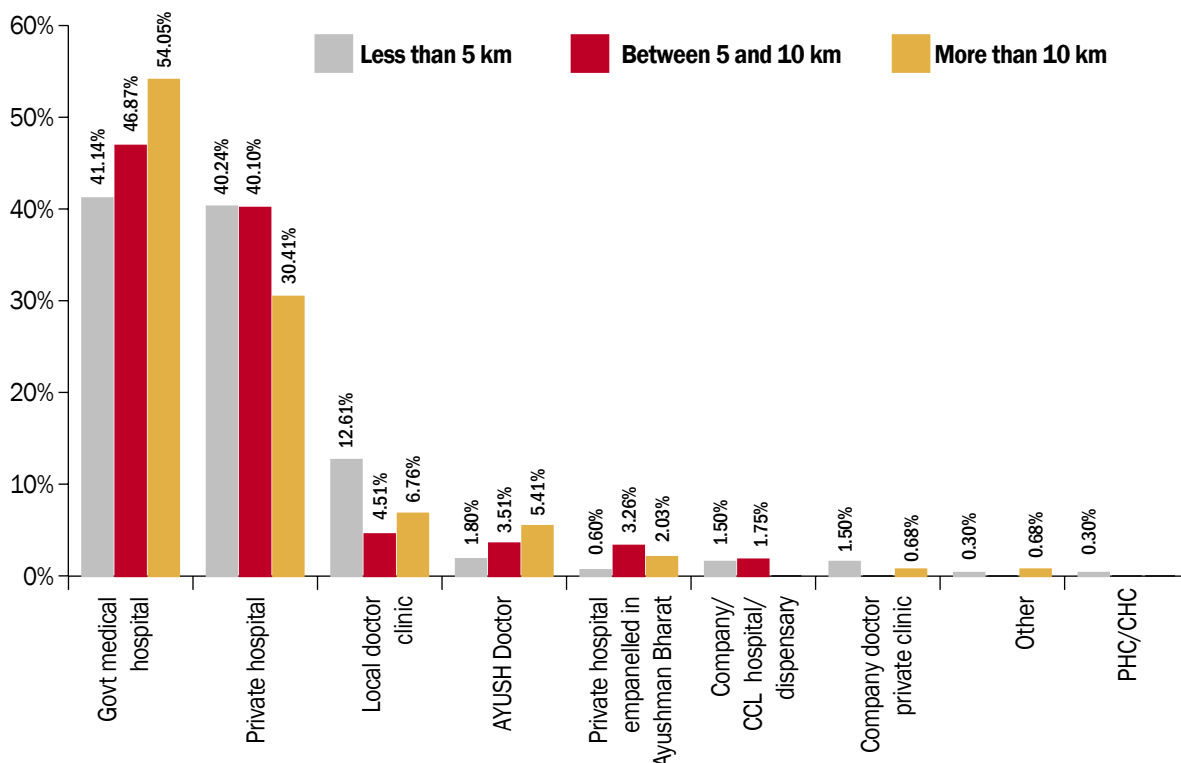
Often, CCL hospitals are understood to be government-run facilities by locals. Based on the survey, 76% of the respondents had at least one member with medical insurance. Of these, 91% availed the Ayushman card, a central government scheme that provides medical facilities to families with an annual household income of less than USD 2,990 (INR 2,54,150). Around 81% of households availing CCL medical insurance reside in the 0-5 km radius of the mines.

CCL plays a key role in supporting education in Ramgarh through its network of educational facilities. The company operates a total of six schools, all named Dayanand Anglo Vedic (DAV) Schools, which aim to provide quality education to children from coal-mining communities.²⁶ Of these, CCL financially supports three DAV schools, each with an average enrolment of around 2,000 students. Additionally, the

company supports the infrastructure of the remaining three DAV schools, serving an average of 800 students each.

Figure 12: Type of medical facilities availed in Ramgarh

The figure shows the types of medical facilities accessed by households in Ramgarh. The majority of households across all three buffers rely on government medical hospitals, followed by private hospitals. Households using CCL medical facilities are relatively few and are primarily located within the 0 to 5 km and 5 km to 10 km buffers.



Note: AYUSH stands for Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy

Overall, 45% of households utilize government healthcare facilities, while 38% rely on private hospitals for medical care. CCL-run hospitals are used by only 1% of households, but those who do use these facilities have significantly lower medical expenses compared to those who seek care elsewhere. The average monthly out-of-pocket expenditure for households using CCL medical facilities is USD 10.40 (INR 832), while for those not using CCL facilities, the average expenditure is higher at USD 14.08 (INR 1,176.40).

In past mine closures, CCL healthcare facilities were either been shut down or replaced with new hospitals or dispensaries, improving local medical services. About 3% of households have been affected by the closure of CCL-run facilities, with the majority located within 5 km of the mines. Only 4% of households report benefiting from the establishment of government-run clinics during previous mine closures.

Fiscal dependency

Since 2015, Ramgarh has corpus of approximately USD 144 million (INR 12.24 billion) in the District Mineral Foundation (DMF), with coal accounting for 80% of DMF collection.²⁷ While government revenues are typically not reported at the district level, CCL

alone contributes over 15% of Jharkhand's non-tax revenues²⁸, excluding Goods and Services Tax (GST) on coal. These revenues are redistributed by the state to various districts, including Ramgarh. To date, nearly 1,210 projects funded by the DMF have been initiated, benefiting a significant portion of the district's population.

Corporate Social Responsibility (CSR) in Ramgarh, led by Central Coalfields Limited (CCL), plays a crucial role in supporting community development. CCL has implemented a variety of initiatives aimed at improving local infrastructure, health-care, education, and social welfare. Through its CSR efforts, the company has funded projects such as building schools, providing medical facilities, improving water supply systems, and enhancing road networks. For the year 2022-23, CCL approved 83 CSR projects in Ramgarh with a cumulative project cost of INR 7.8 crores (USD 0.89 million).²⁹ Additionally, the GST cess from coal levied at INR 400 per ton of production amounts to USD 5.41 million (INR 449 crores) in Ramgarh, offering significant revenue for district development activities.

3.1.4 Diversification Potential

In this subsection we assess the diversification potential of households and enterprises based on their aspirations and preferences to move to non-coal sectors in Ramgarh.

Our findings are premised on the assumption that in the event of a coal phase-down, households and enterprises can be employed in sectors of their choice, or one where their skills most closely match. For households, it is also essential to assess whether the second generation has aspirations for working in the coal sector. Several studies have shown how a slowdown of coal in Ramgarh is stimulating skilling in other sectors like cottage industries etc.³⁰ While diversification potential for various enterprises rests on the support they garner, minimizing the challenges they face in terms of finances, infrastructure and availability of skilled labor will also go a long way.

We assess the aspirations of household members for alternate livelihoods in the event of coal mine closures. We do this by understanding the aspirations at two levels: 1) aspirations for children, and; 2) sectors preferred by households.

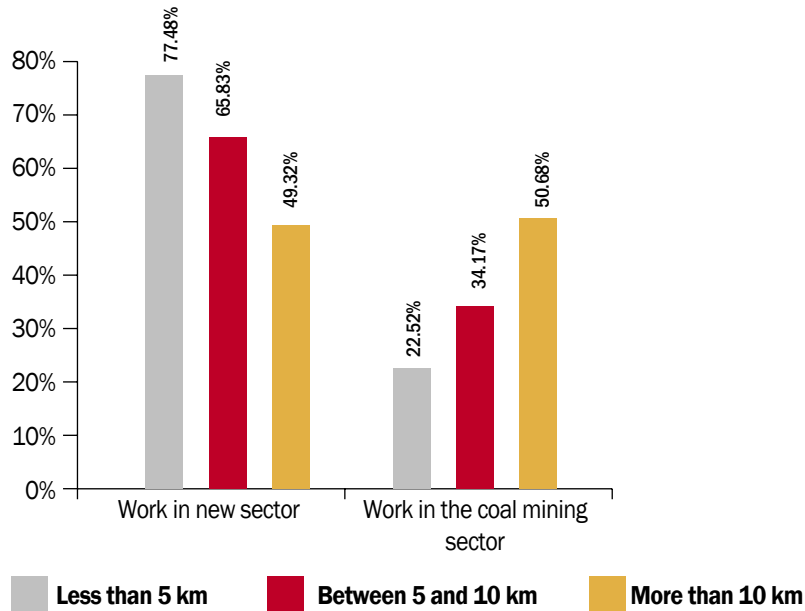
For industries, we assess 1) sectors of preference that they want to diversify into, and; 2) their readiness to diversify, and the challenges they face in four core areas—institutional, infrastructure, finance, and labor.

Aspirations for children

Our estimates show that 77% of households within a 0-5 km radius of the mines prefer their children to work in non-coal sectors. In contrast, about 50% of households beyond 10 km are more likely to want their children to work in the coal-mining sector. Families directly involved in the coal sector tend to be better off financially, and this generational dependency has provided more opportunities for education and branching into different industries. As a result, these households are more likely to encourage their children to pursue careers outside of coal mining. On the other hand, families farther from the coal industry often face fewer lucrative alternatives, which may lead them to prefer coal-related jobs for their children, given the limited economic opportunities in other sectors.

Figure 13 : Household-level aspirations for children in Ramgarh

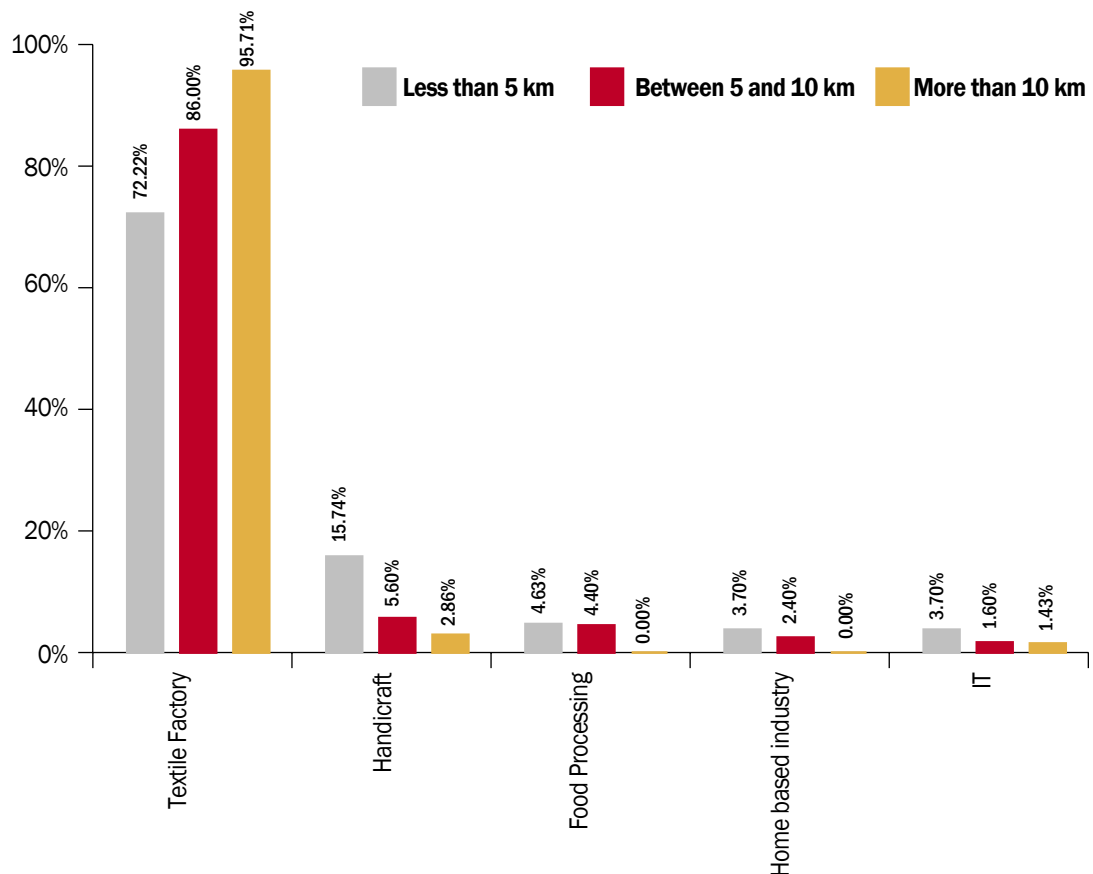
This figure illustrates household preferences for coal and non-coal sector employment opportunities for their children. The majority of households in the 0–5 km buffer still prefer their children to work in the coal sector.



Preferred sectors for households in Ramgarh

Figure14: Alternate sector choices of households in Ramgarh

The figure illustrates preferential sectors for households to diversify



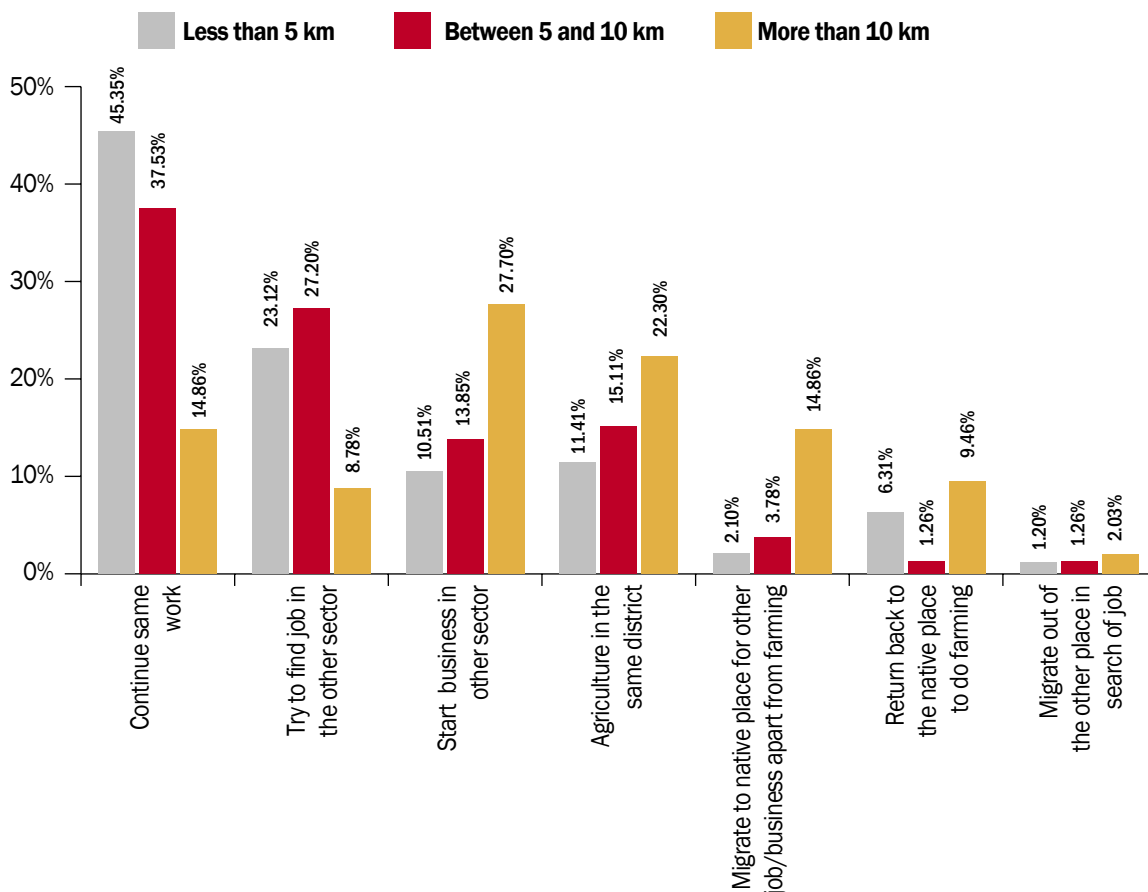
Based on the survey, 42% of working respondents prefer to do a job in the IT sector. This preference is highest among households within 0-5 km of the mines. Brick-making, which is highly coal-intensive, is an alternative sector of choice for livelihood for 12% of the respondents. Sixty percent of the respondents who prefer brick-making reside in areas within 0-5 km of the mines. Other major sector choices include non-coal based MSMEs (12%) and non-coal transport (9%). While 6% of the respondents in the survey prefer moving to renewable energy sectors such as solar and wind, 2% prefer tourism as an alternate sector of choice for employment.

There are several sectors that the households perceive as having the potential to develop in Ramgarh. Overall, the textile sector is the main sector for diversification in Ramgarh according to 85% of the households. The preference for this sector is high as many household members work as migrant labor in the textile sector in other states. Setting up textile units in Ramgarh would help them find employment easily given their skill set. Other promising sectors include handicrafts, food processing, and cottage industry

Overall, 30% of households that are likely to be impacted by closures prefer either to practice agriculture in Ramgarh or start a business. While 5% of households prefer migrating back to their native region, only 1.3% want to migrate to a different place for employment opportunities.

Figure 14: Household sector diversification

The figure illustrates new sectors that households perceive can most likely be pursued in the event of a coal phase-down.



Preferred sectors for industries in Ramgarh

Based on our survey, 57% of registered enterprises are planning on diversifying to new sectors. For those not willing to diversify, access to finance is the main hindrance (for 14% of the enterprises), while poor law and order is an obstacle for 7%.

Figure 15: Preferred sectors for diversification for registered enterprises in Ramgarh

The figure illustrates the diversification preferences of registered enterprises into non-coal-related sectors. The majority of enterprises favor transitioning to agriculture or forest-based industries, construction, non-coal transportation, and the IT sector.

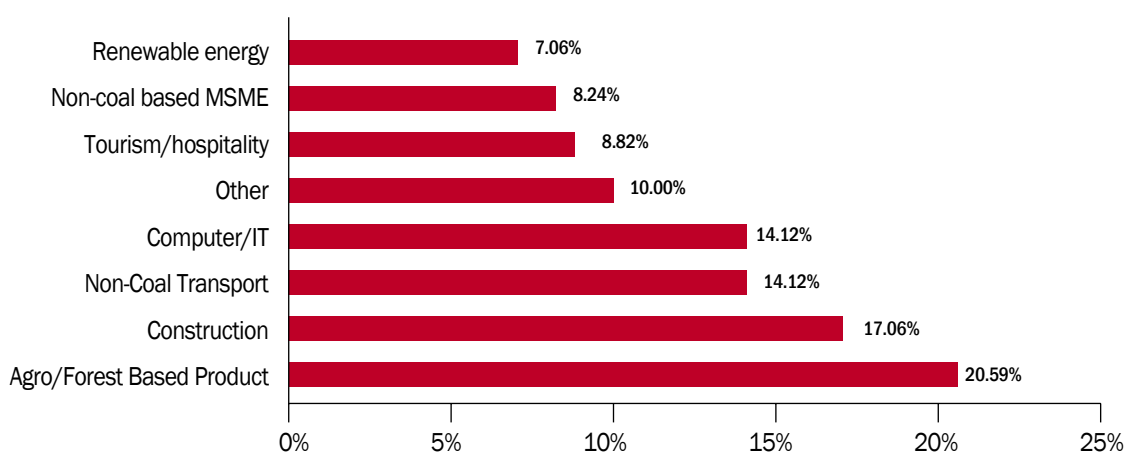
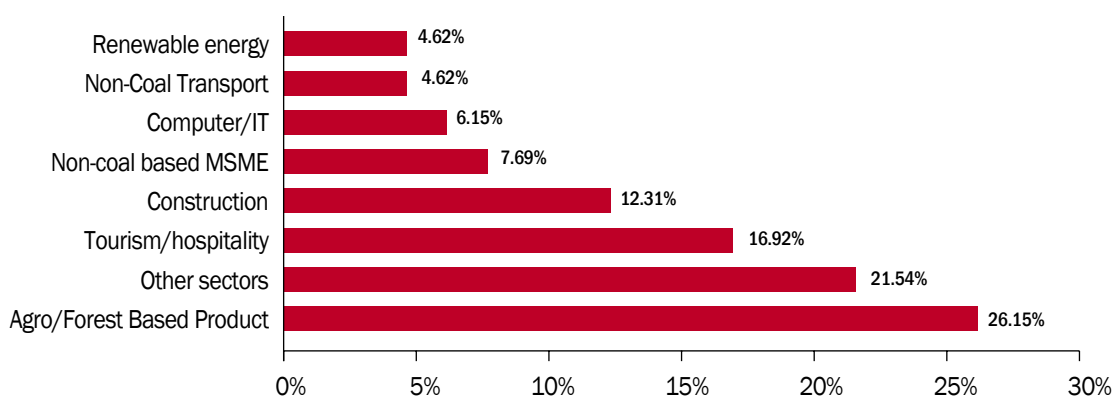


Figure 16: Preferred sectors for diversification for unregistered enterprises in Ramgarh

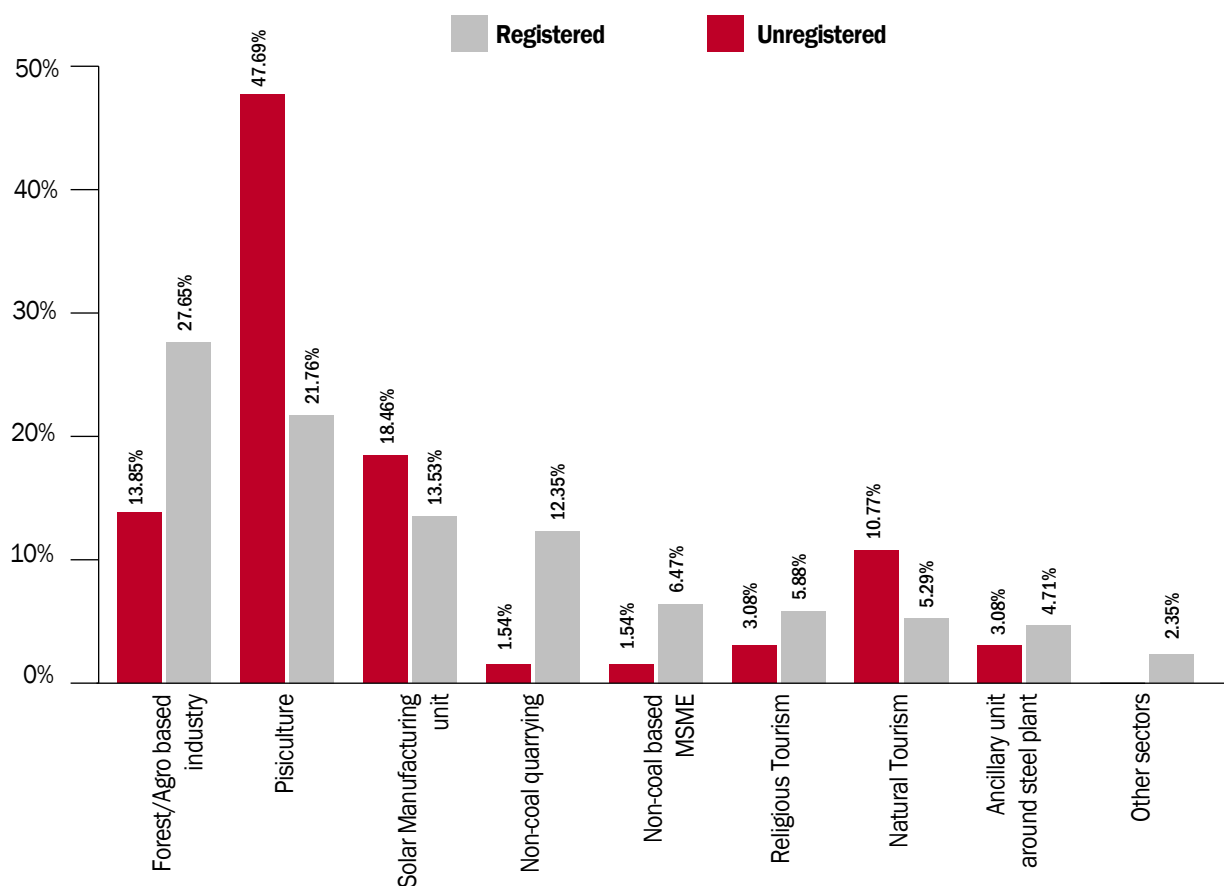
The figure illustrates the diversification preferences of unregistered enterprises into non-coal-related sectors. Agriculture and forest-based products, tourism and miscellaneous jobs are the top priority sectors.



Enterprises that want to diversify enlisted a range of options that they want to diversify into. Approximately 20% of the registered units want to diversify their business to the agro or forest sector, while 17% want to engage in construction activities. While the non-coal transport sector is a preference for 14% of the enterprises, another 14% want to expand to the computer or IT sector. Renewable sector including solar or wind energy is the least preferred option with only 7% of sampled enterprises willing to diversify there.

Figure 17: New sectors for diversification in Ramgarh

The figure illustrates the strategic sectors for Investment in the district based on insights from the enterprise survey.



Based on the survey of unregistered enterprises, 55% would like to expand their business to new sectors. However, for those not planning to diversify, poor law and order conditions (42%) is the main factor for hindrance, followed by high cost of financing (22%). In terms of preferred sectors for diversification, as in the case of registered enterprises, the majority of unregistered enterprises would prefer to diversify into agro- or forest-based industries. Approximately 22% enterprises would prefer opening small-scale agro-businesses, practice pisciculture, or open wholesale or retail outlets. Tourism and hospitality is another pivotal sector for diversification for 17% of the enterprises. In addition, construction, non-coal based MSMEs, and the IT sector are quoted as sectors of preference.

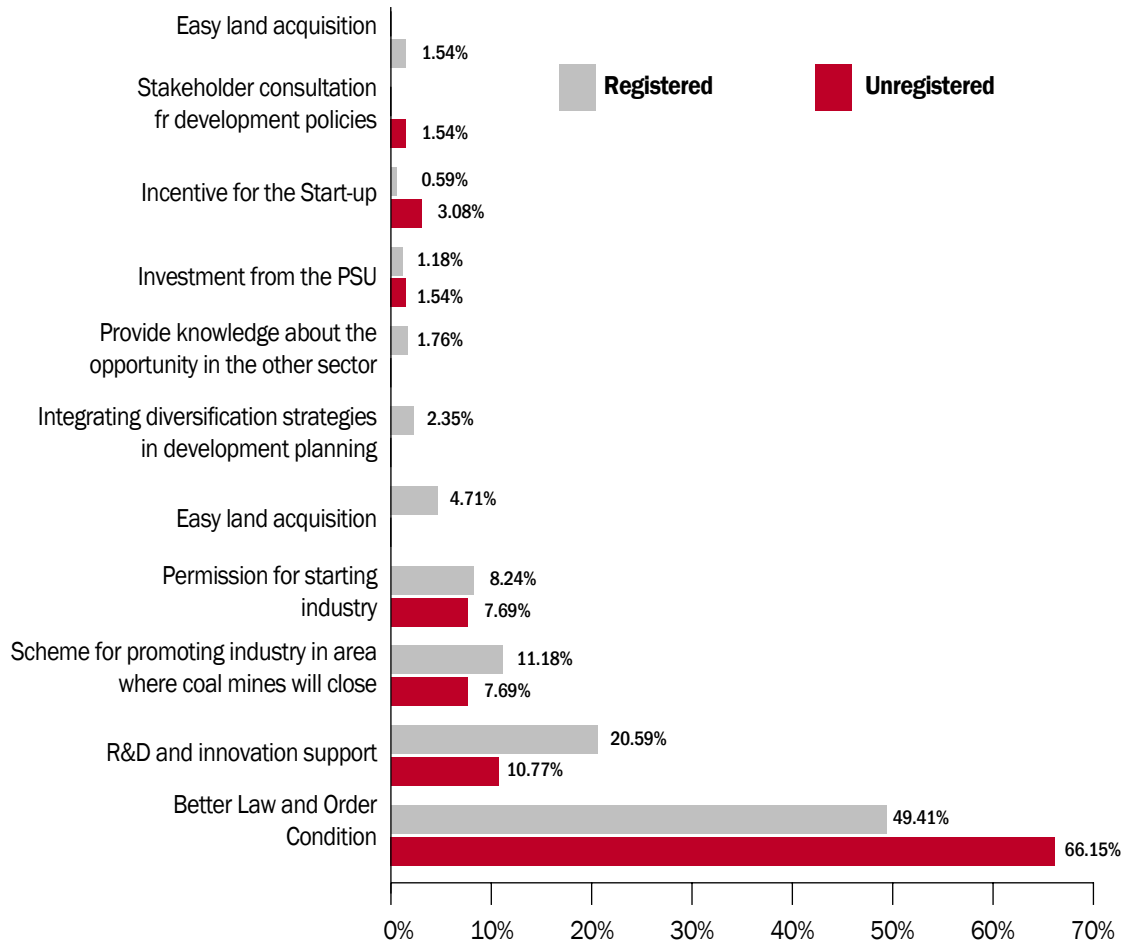
Institutional

Institutional support plays a critical role in fostering economic diversification of coal mining regions. For industries to transition and diversify into new sectors, they need robust support from the government and regulatory bodies, including in the form of policy incentives, and access to research and development. In our survey, when industries were asked about the kind of institutional support they need, nearly 50% emphasized the importance of improved law and order. In addition, both registered and unregistered enterprises expressed a strong need for greater research and development support, as well as specific schemes aimed at promoting new industries in

areas where coal mines are expected to close.

Figure 18: Institutional support required for diversification in Ramgarh

The figure illustrates the institutional support enterprises require for diversification. The key needs include improved law and order conditions, research and development support, and schemes to promote new industries in areas where coal mines will be closed.



So far, out of the registered enterprises that want to diversify, only 20% have received any form of institutional support, the majority of this support being in the form of financial support and bank loans.

Infrastructure

A major component for diversification is adequate infrastructure. Previous research on economic diversification in different countries shows that supporting infrastructure has become a prerequisite for creation of industrial clusters and accelerated development.³¹ In terms of coal regions in India, as shown in our analysis of coal dependency (3.1.1), coal companies have become a pivotal source of infrastructure needs like electricity and water connection. Based on our survey, approximately 63% of registered enterprises have adequate infrastructure for diversification.

These businesses would be more likely to consider expanding into new sectors due to the availability of reliable utilities, transportation, and other necessary resources. However, the remaining enterprises would face significant challenges, including unreliable or a lack of access to basic internet services and inadequate electricity and water connections.

“

There are other alternatives to coal. The mines can be used for tourism. The government can develop them as tourist spots. They can also set up a tribal village.”

Focus group discussion with PRI members in Ramgarh

Additionally, our results show that 44% of registered enterprises availing state government-provided electricity consider this a major obstacle for future diversification. This is exacerbated by the fact that 29% of these enterprises experience 4-5 hours of power cuts a day. On the contrary, a majority of the enterprises availing CCL connections consider this as a moderate or minor obstacle for diversification.

In terms of water supply, while 55% of the registered enterprises use their own sources such as wells and hand-pumps, 27% rely on municipal water supply. Only 16% of sampled enterprises avail water supply through CCL.

The situation is similar for unregistered enterprises, as 40% use their own source of water. Overall, while 6 out of 10 registered enterprises consider they have adequate infrastructure for diversification; only 3 out of 10 unregistered enterprises are infrastructurally adequate to diversify.

Labor

Adequate labor support is pivotal for diversification primarily for two reasons. First, investment into human capital increases productivity³², and second, it allows for more labor specialization.³³ Based on the survey, the minimum level of education for permanent employees is secondary schooling for 38% of registered enterprises, and 25% for unregistered enterprises. A key differentiating factor for both the surveys is labor availability. More than 25% of employees have permanently migrated for 41% of registered enterprises, compared to 24% of unregistered enterprises.

In terms of readiness for diversification, while 61% of registered enterprises perceive themselves as adequately equipped with skilled labor, only 33% of unregistered enterprises perceive that to be the case. The major reason for registered and unregistered enterprises not having skilled labor for diversifying is a lack of training in other sectors, which means that people are almost exclusively trained to work in the sector in which they are employed, and due to this skill gap inter-sectoral mobility of labor is limited. In both surveys, more than 45% of the enterprises consider workers to be trained for one sector, which inhibits intersectoral mobility of the workforce. While this reflects on the mono-economy ecosystem in Ramgarh, where coal is central to employment and skill development, it can also be perceived that workers prefer working in sectors they are skilled in. Other reasons include the non-availability of an English-speaking workforce and the lack of education facilities.

In order to diversify, labor support for skilling is crucial. Considering the availability of options, labor support can be garnered in the form of training centers, schemes for retraining, opening of educational facilities, among others. A majority of the enterprises perceive opening new training centers as a major form of support required for obtaining a skilled workforce.

Figure 19: Reasons for the lack of a skilled labor force for diversification among registered enterprises in Ramgarh

The figure illustrates the reasons for the lack of a skilled labor force among registered enterprises. The primary factors include limited training opportunities for workers in diverse industries, a workforce that primarily speaks non-English languages, and insufficient educational facilities.

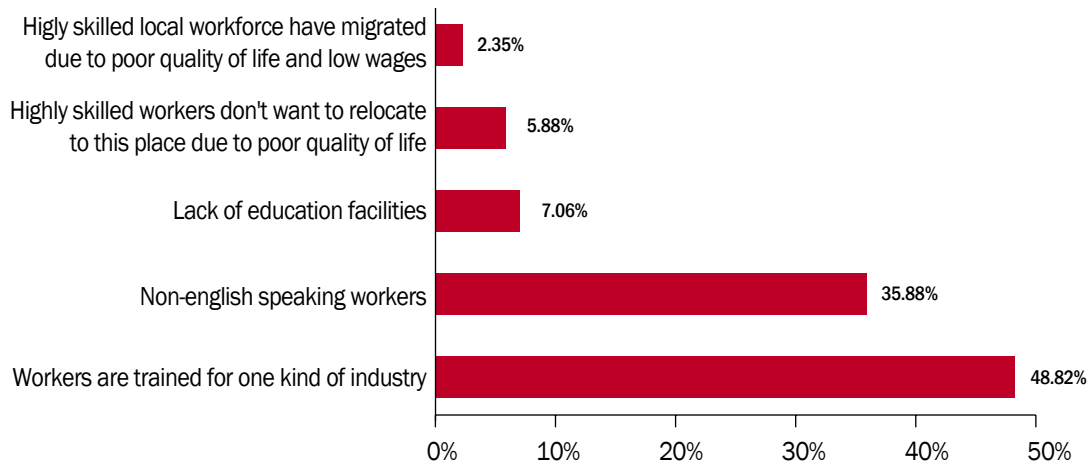
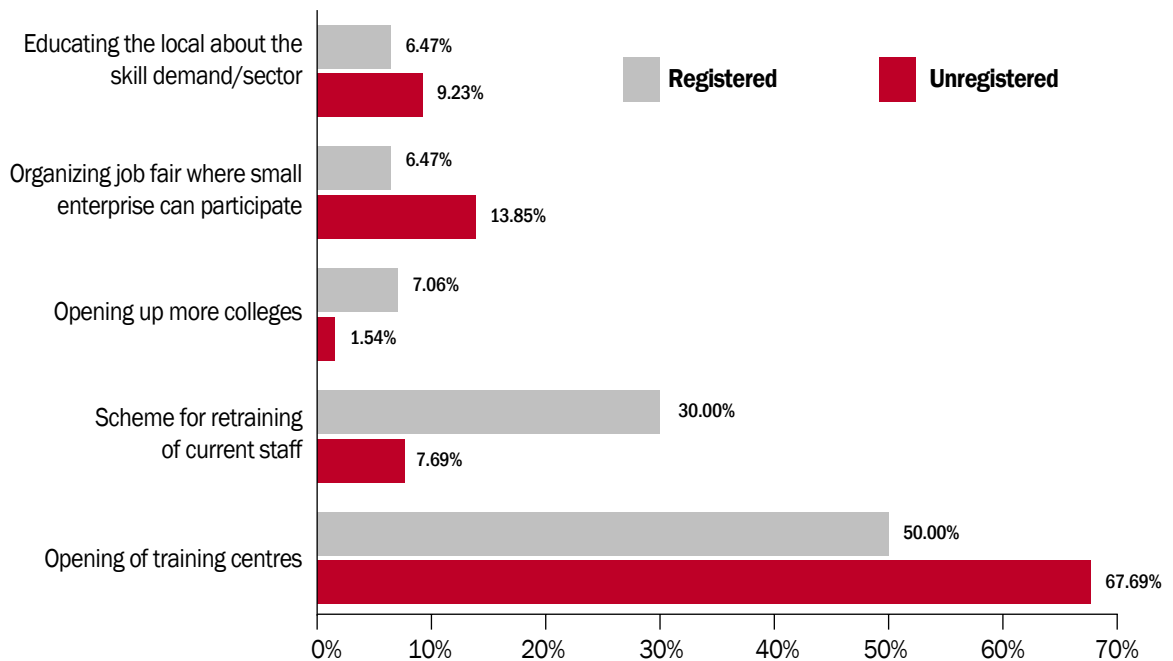


Figure 20: Labour support required for diversification in Ramgarh

The figure illustrates the labor support preferences for diversification as reported by enterprises. The key forms of support required include the establishment of training centers, schemes for retraining existing staff, and the organization of job fairs.

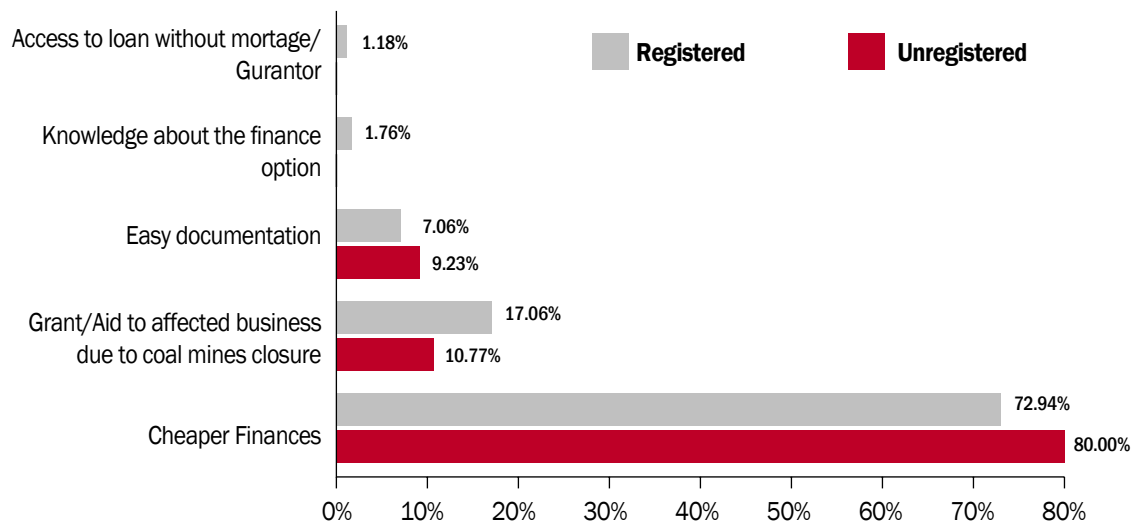


Finance

Finances are indispensable for diversification; building internal and external financial support aids the diversification process. The majority of registered enterprises (50%) and unregistered enterprises (55%) depend on scheduled commercial banks (SCBs) for loans and financial support. Additionally, when asked about diversification, while 74% of registered enterprises require cheaper financing for diversification, 15% would prefer funding from government schemes. However, the majority of the unregistered enterprises (45%) prefer government schemes for financial support to support their diversification journey.

Figure 21: Financial support needed for diversification in Ramgarh

The figure shows the financial support required by enterprises. A key need for most enterprises is access to lower-cost financing.



Map 2: Block-wise sectors for diversification in Ramgarh

We identified potential sectors in different blocks based on our survey findings, interviews, and focus group discussions, taking into account the existing comparative advantages and policy support for each sector.



In terms of support needed for diversification, a significant amount of registered and unregistered enterprises want cheaper finances; this would essentially entail loans on low interest rates. Other support needed includes grants and aid to affected businesses post-closure; and an easy documentation process.

3.1.2 Pathways for diversification for Ramgarh

Ramgarh district has traditionally been a coal-dependent district, and the district needs to diversify economically to have a sustainable future. This diversification needs to be multi-sectoral given the current dependency on coal. In this study, we identified multiple sectors for diversification. The sectors span a wide range, including tourism, food processing, overburden (OB) utilization, and M-sand production. The sectors are identified based on household and industry aspirations, natural potential available in each block, and existing government policies.

Tourism

Tourism has emerged as one of the sectors of choice for both households and industries. Around 12% of industries reported that tourism can be an important sector for diversification. We analyzed the potential of the different blocks of the district and found that tourism has the maximum potential in the Chitarpur and Patratu blocks. This identification is done based on the aspirations of the people and industries, and most importantly, the presence of the tourism sites and the natural potential and comparative advantage of these blocks in terms of factors like accessibility, transportation, and infrastructure, etc.

Ramgarh has the potential to be a district with a complete tourism circuit as its different blocks offer sites for religious, mine and natural tourism, such as Chitarpur for religious and mine tourism, Patratu for natural tourism, etc. Ramgarh is blessed with natural beauty with the picturesque Patratu valley, and the religious shrine, Maa Chinnamastika Temple (popularly known as Rajrappa temple), promotion of which can provide a major impetus to tourism in the district.

Ramgarh is uniquely placed geographically, being close to the state capital which makes air and road connectivity accessible for tourists. In addition to Rajrappa Temple, there are other tourist sites like the Prachin Shiv Temple, an archaeological monument under protection of the Archaeological Survey of India (ASI). Additionally, the old patch of Rajrappa OCP can be converted into a mine tourism site. As the mines patch is close to the temple which attracts a lot of devotees, development of an eco-tourism site near the mines will help to further increase footfall and generate revenue. The district also has important heritage sites like the Ramgarh Fort.

The pathway for diversification into tourism involves comprehensive planning and a long-term approach.

Challenge: Finance and infrastructure

- **Lodging:** The lodging infrastructure in and around the region is inadequate to support large-scale tourism. In the district, there are few resorts in the Patratu Valley, but generally, hotels catering to tourists of different income groups are not available. As per India Tourism statistics 2023, the state has only two accredited hotels, whereas in the country there are around 1716 such hotels

and lodging facilities³⁴. The hotels and resorts in the districts need to be standardized and upgraded to meet accreditation standards of the government of India. Additionally, lodging facilities near the Rajrappa Temple need to be developed to attract religious tourists.

- **Public transportation:** Another major challenge is the public transportation network in the district. The district needs to develop its public transport infrastructure. While the district administration has taken steps to overcome transportation challenges for the devotees visiting the Rajrappa Temple, in general there is a lack of a reliable public transport network.
- **Publicity and awareness:** Ramgarh is an established tourist destination in the state and people of the region visit the tourist spots for both recreational and religious purposes. The challenge is that these places are not well known outside the state. Local tour operators and travel agents play an important role in promoting tourism, and as per India Tourism statistics 2023, the state has only 5 approved tour guides and agents, compared to 1300 such operators and agents in different categories across India. Promotion and publicity of these tourist sites would be necessary to promote tourism and bring tourists in large numbers to the district.
- **Law and order:** The law and order situation is a major binding constraint for both the investor and the tourist. It is a well-established theory that better law and order brings economic growth to the place. In Ramgarh during our survey, industries also raised the concern that poor law and order inhibits growth. Similarly, the installation of proper street lighting in and around tourist spots along with CCTV surveillance can boost the confidence of tourists, especially those travelling with kids and family.
- **Unable to generate enough income:** The growth of the tourism sector depends on how much money tourists are willing to spend at a location. Ramgarh is visited by many tourists but due to a scarcity of avenues for spending the income generated through tourism is not high enough. In the context of just transition, any sector which is part of economic diversification would have to generate enough revenue to make up for the loss of coal-related income and revenue for the people and state. So, low income generation is a threat to diversification into tourism, and proper planning needs to be undertaken to create avenues for tourist spending.

Opportunity: Potential for a tourism circuit

- **Potential to create a tourism circuit:** The challenge with tourism is that visitors don't visit any location for one tourist attraction. Having only one well-developed tourist site can also reduce the tourist's propensity to spend. Ramgarh has the potential to develop a complete tourism circuit connecting Patratu Valley, Maa Chinnamastika Temple, mines, Prachin Shiv Temple, and the historical site of Ramgarh Fort, along with a few other religious shrines. In addition, at the border of Hazaribagh and Ramgarh District, an old mine Gidi-C has applied for the status of Ramsar site. If it gets listed as a Ramsar site, it would be the first such site in the state, and also the first coal mine in the country to be awarded the Ramsar site status. These unique features will also help to attract tourists.

- **Overall development of the district:** The promotion of tourism, development of lodging facilities, and street lighting can help with the overall development of the district. In the process of development, the physical infrastructure would also improve, serving both the development goal of the district administration and beautification of the district.
- **Prominent tourist place in Eastern India:** The district has the potential to attract tourists given the different strategic advantages thanks to its geography and history. The state attracted 3.82 crore domestic and 19 lakh international tourists in the year 2022-23³⁴. The number of tourists is currently below pre-pandemic levels. To boost tourism, Ramgarh should promote its scenic landscapes and religious sites more effectively. With the right marketing, the district has the potential to become a major tourist destination.
- **Potential of livelihood sources:** The development of tourism around Rajrappa Mines and the Maa Chinnamastika Temple could play a key role in facilitating a just transition, as these areas are heavily dependent on coal. Should coal production decline, tourism can provide locals with alternative livelihood opportunities. Beyond its local impact, expanding tourism will also create a range of new employment opportunities in sectors like passenger transport, hospitality, and more.

Key Recommendations for Tourism Sector

Blocks: Patratu and Chittarpur

1. **Convergence in policy:** Different policy instruments are available to promote tourism in the district. The action plan needs to align to achieve the larger objective of promoting tourism as a main sector in the district.
2. **Local Finance:** The current financial instrument does not specify the use of funds for just transition, but within the current regulation a lot of activities can be promoted to boost tourism in the district (for example use of CSR for skilling and health, and DMF for infrastructure development).
 - **DMF and CSR Corpus to create the infrastructure and training.** The district has a corpus of USD 150.82 million (INR 12.82 billion) as of January 2024. In addition to DMF, CCL spent roughly USD 0.94 million (INR 8 crore) for community development. A part of this money can be used for promoting the tourism sector through developing infrastructure, publicity campaigns for tourist sites, and skill development in the district. In the short or medium run, that is, in the next five years or so, the DMF money can be used in the following ways:
 - **Development of an eco-park or mine tourism:** The DMF money can be used to develop the mines as tourist sites in an old patch of Rajrappa opencast mines.
 - **Development of infrastructure near the tourism site:** DMF and CSR funds can be used to provide basic necessities near the tourism site. CCL can use its CSR money to build public toilets and healthcare

facilities near the tourist spot.

- **Promotion of skill development activities:** Under CSR, skill training in hospitality and for tourist guides can be an option, as this is permissible under the Company's Act (2013).
- 3. Promotional activities:** A 'Ramgarh Tourism Week' can be held annually to attract tourists to the district. The best time would be around monsoon and early winter. During this period, the lush green landscape and the festive seasons would attract tourists interested in religious and natural tourism. The Ministry of Tourism's schemes and CSR funds can be used for these activities.
 - 4. Attracting investment:** To attract investment in the sector, the tourism circuit needs to be promoted, and incentives could be a way to attract tourism. Land can be identified for the development of recreational parks and accommodation.

Food Processing

Households and enterprises both believe that food processing can be an important sector for diversification in the district. In the enterprise survey, 28% of the respondents feel that food processing can be an important sector for diversification. The survey results largely align with the overall agriculture profile of the district.

Ramgarh district is an important vegetable-producing region of the Chota Nagpur Plateau. The district has an average cropping intensity of 119%, with two blocks, Gola (260%) and Dulmi (140%)³⁵, having the highest crop intensity. In commercial crops, cauliflower, potato, and cabbage are the major crops. These are mainly produced in Gola, which is also a major vegetable supplier in the region. The cropping pattern also suggests that local farmers produce vegetables along with cereals in the region.

In addition to paddy and commercial crops, Ramgarh's climatic condition and soil profile suggest that millet can be produced in the district at a commercial level. Based on the soil profile, the soil card prepared by the district agriculture officers finds that Mandu is the most suitable block for millet production. The state and central governments are also taking steps to boost millet production. The state government also wants to use millet production and processing to create livelihood opportunities. As the aspirations of the industry and state aspirations match, millets can be one of the sectors to diversify into economically.

The food processing sector covers different products, and the requirement of these different products differs both in terms of the infrastructure and climatic conditions required. Therefore, the food processing sector requires specific attention regarding different products.

Challenges:

- **Non-existent processing facilities and supply chains:** The district is the main supplier of raw vegetables in the region, but processing facilities are lacking in the state. This means that the district is not able to capture the economic value of its food processing potential.

- **Lack of a skilled workforce:** In our survey, 6 out of 10 registered enterprises reported unavailability of skilled people as a challenge to diversification. At the same time almost half of the enterprises feel that people are only skilled to work in the sectors they are working in now, and without proper retraining, they will not be able to move to new sectors.
- **Lack of knowledge about the food processing sector:** In focus group discussions and pre-report consultations, many local entrepreneurs expressed a lack of knowledge about how to enter the food processing sector in the district. Similarly, farmers are unaware of the benefits of millet production and continue to grow traditional crops such as maize, paddy, and vegetables. To address this, the Agricultural Technology Management Agency (ATMA) and the District Industrial Center should focus on raising awareness and building capacity to encourage the development of these emerging sectors.
- **Attracting investments in the food processing sector:** The food processing industry requires large capital investment to create infrastructure and set up facilities. In the survey, both registered and unregistered enterprises reported poor law and order conditions, high interest rates, as well as poor electricity supply as the major obstacles in attracting investment. Additionally, a lack of awareness about the district's potential in food processing is also seen as a major challenge in attracting investment in the sector.

Opportunity

- **Potential to increase farmers' income:** Processing raw materials enhances the economic value of products for producers. The additional income generated from this will not only benefit the producers but also strengthen the local economy, as any increase in local income tends to have a multiplier effect, further boosting economic activity in the area.
- **Industrial-scale millet production:** The Mandu block has the potential to become a hub for millet production, as its soil profile suits millet production. The block also has the potential to utilize the coal mine water for irrigation purposes. This will serve the dual purpose of growing the crop at an industrial scale and proper utilization of the mine's water, which otherwise would be wasted. The current crop intensity of Mandu which is around 80% also supports introduction of new crop varieties as all the agricultural land is not being used to its fullest potential. In addition, millet production will help farmers to diversify their crop and hence reduce the risk of crop failure. In addition to vegetable processing, millet production will attract investors in millet processing and packaging. The state government wants to use millet processing for generating local employment.
- **Generate local employment:** The development of the food processing value chain can create local employment across the supply chain, which can accommodate people with different skill sets. Women entrepreneurs can also get jobs in packaging and millet processing through SHGs.
- **Developing the product line:** The creation of a food processing industry in the district can help to develop a full product line based on local products. For instance, under the PM-FME One District One Product (ODOP) scheme,

potato has been identified as the product for the Ramgarh district, so a full product line can be developed from the vegetable.

Recommendation

Block: Gola and Dulmi (food processing) and Mandu (millets)

- **Creation co-operatives and Farmer-Producer Organization (FPO):** The district should form more co-operatives and FPOs so that a common resource for food processing can be created. Under the central government scheme of PM-FME, there is a provision to create a common infrastructure for food processing that can be used by the FPOs. The district agricultural office and cooperative department should plan and implement a strategy for the creation of these FPOs and also identify the common resources that need to be developed.
- **Setting up a mega food park in Gola block:** Gola is the main vegetable-producing block in the district. The crop intensity is also very high, so the scope for new crops is low. The district administration, along with the district rural development office and other concerned departments, should plan and establish a food park under the provisions of the Jharkhand Food and Feed Processing Industry Policy 2024. The food park will attract private investment to the sector.
- **Create awareness about different schemes and products:** The district administration, along with the skill development department, ATMA Ramgarh, and the District Industries Centre, should create awareness among local entrepreneurs and farmers about the different options available for food processing industries in the district.
- **Incentivize the introduction of millet in Mandu block:** Mandu block in the district has strong potential to become a major hub for millet production, with soil testing already completed. The ATMA and the district's agricultural extension office should actively incentivize and promote millet farming. Millet cultivation can create local employment opportunities and pave the way for new product lines. During the study, it was observed that irrigation is a key challenge in the region. However, the coal mines in Mandu present an opportunity to utilize mine water for agricultural purposes. To address this, the district administration, irrigation department, and Central Coalfields Limited (CCL) should collaborate to ensure a steady flow of water from the mines to the crop fields.
- **Use CSR funds and central government schemes for skill development:** As discussed in the challenges section, skilling is one of the major challenges to the diversification of the district economy, and even though the district has the availability of raw food products, processing facilities are non-existent, with skilling being one of the major challenges. So, to develop skills for employment in alternate sectors among locals, district administration and skill development officers along with CCL and TATA Steel should use CSR money for skilling based on ground evidence and local requirements. CSR funds under the Company Act 2013 allows companies to spend the money

on skilling. Along with CSR funds, DDUGKY and PMKVY scheme funds and allocation also need to be used. A complete skill vision, resource document, and a committee composed of members from CCL, TATA Steel, the local chamber of commerce, DIC and the skill development officer and district collector need to be created.

- **Attracting investment in the food processing sector:** In the survey, it was reported that the lack of skills, infrastructure challenges, and availability of the funds are major concerns for attracting investment in the district. There are multiple avenues available through government schemes like PM-FME and Jharkhand Food and Feed Processing Industry Policy 2024.³⁶ These policies can provide the impetus and the initial investment and also help the districts to attract investment from the bigger players in the sector.

Coal waste to wealth: Overburden to sand

Coal production in Ramgarh mostly comes from opencast mines. In opencast mines, to produce coal the topsoil and overburden rocks need to be removed to evacuate coal from the mines. In this process, a substantial amount of overburden is generated which is considered as waste. In the last 4-5 years, attempts have been made in different parts of the country to gainfully use these overburdened rocks, by crushing them to create sand known as man made sand or M-sand. Ramgarh OC has a stripping ratio of 1.36-3.90 cubic meters per ton(cum/te). So, OB to M-Sand has potential in the coal producing block of the district, mainly in the Mandu block.

Challenges

- **Lack of acceptance among consumers:** Natural sand has been traditionally used for the construction of houses and buildings, so finding the acceptance of the new product among consumers is a challenge. A behavioral change is required to increase the acceptability of M-Sand.
- **Entry barrier:** The supply chain and market for sand is unorganized, and dominated by powerful and influential people, therefore entry into the new market is challenging, especially where natural demand for the product among the consumers is lacking. A strong push and policy support is needed from the government so that new players can enter and stay in the market.
- **Missing policy framework:** Policy support for M-Sand is missing at present. The Ministry of Coal has taken few proactive steps to promote OB-to-sand conversion and there are around 5 OB-to-sand plants established in different states like Maharashtra, Telangana and Madhya Pradesh³⁷. Additionally, Indian Railways has taken steps to transport sand by rail but the amount of sand being transported is still minuscule in quantity. The major transport mode is by road. Strong policy support is required in the sector, given the overall benefit of M-Sand.

Opportunity

- **Diversification locally:** During interviews with CCL officials and pre-report consultation meetings at the District Collector's office in Ramgarh, it was observed that M-Sand would create the opportunity in the mining area to devel-

op a new sector, which would in turn create an opportunity for local diversification. This is important for both the complete value chain repurposing and also as an opportunity to local coal communities to engage in a new sector of employment.

- **Value chain repurposing:** In the Financial Year 2023-24, in Ramgarh district on an average 3.39 rakes of coal per day are dispatched from CCL mines²⁶. Some 1237 rakes are transported in a year. The coal evacuation network is very strong around the district and coal transportation contributes significantly to railway revenue. In the event of coal production decline, the railways will also lose revenue. At present these railway networks and storage infrastructure can be the enabling factors for M-Sand transportation. So, given the future scenario and present context, M-Sand can act as a major avenue for complete value chain repurposing.
- **Environmental benefit:** Natural sand is extracted from river banks and causes the degradation of the river bank³⁸. There are instances of over-extraction, which in many instances are illegal³⁹. There is still a National Green Tribunal judgement pending on sand mining. So, M-Sand can also be useful in protecting river banks from degradation.
- **Availability of sand throughout the year:** The challenge with natural sand is that during the monsoon season when the rivers are overflowing or flooded, a scarcity is created in the market as the production is halted. Additionally, often owing to environmental regulations, production has to be stopped⁴⁰. M-Sand can be a good alternative which can supply sand throughout the year and help to overcome any scarcity in the market, which would be beneficial for consumers and the real estate sector.

Recommendations

Block: Mandu

- **Royalty differentiation:** The state government needs to charge lower royalty on M-Sand, as it will provide a price advantage over natural sand, which can help increase its acceptability among consumers, especially in the price-sensitive market.
- **Promote M-Sand in government and PSU construction:** The district administration and CCL need to incentivize the use of M-Sand in their contractual construction activity; the use of the product can help to increase the acceptance in the market and will lead to acceptance among consumers. The other benefit of M-Sand is that products of different coarseness and shape can be produced, so they can be used in construction of roads, pavements and other places. So, CCL needs to promote this product to different consumer segments, especially in the government sector. Consumer acceptance and price differentiation will help to break the entry barrier.
- **Quality certification:** To boost consumer confidence and also to ensure the quality of the product, quality assurance certification needs to be taken from an independent agency. M-Sand producers need to be proactive in this aspect and securing the certification in the early stage of production would be

ideal.

- **Planning value chain repurposing:** The M-sand sector provides an opportunity for railway value chain repurposing. The divisional railway, along with CCL, should plan value chain repurposing and create a medium and long-term plan for the repurposing of value chain, creating scope for sand transportation.

Pisciculture

Ramgarh currently produces 6% of Jharkhand's total fish production.⁴¹ The presence of the water body in Patratu and opportunity for the repurposing of the coal mine void can provide opportunities for the district to enhance fish production. The district's major supply of fish comes from southern states, so there is a gap ready to be filled in fresh fish supply.

Challenges

- **Infrastructure:** Although the district produces 6% of the total fish, processing facilities in the district for fish processing, and storage infrastructure, is missing. In the interview with the Fishing Co-operative Society in the Saunda, Ramgarh, cold storage facility was the major infrastructure gap followed by packaging facilities.
- **Lack of investment:** Investment in pisciculture from the private sector is very minimal, and largely, sectors are unorganized. A lack of investors is the major challenge for developing infrastructure and practicing pisciculture at scale.
- **Lack of awareness:** There are multiple government provisions under Blue Revolution scheme⁴² which incentivizes fish production in the state. During the survey and interviews, it was observed that the people involved in the sectors are not aware of these government schemes.

Opportunities

- **Generate local livelihood:** The development of the sector can create local livelihoods in the area. Local employment can be created using the fisheries co-operative, which can generate livelihood from one source. Additionally, processing facilities can also help to create livelihoods for skilled workers.
- **Void repurposing:** There are ample opportunities for repurposing the old void for fish production in a state where there are 1741 coal pits and reservoirs with a total area of 9880 hectares.⁴² The district administration has launched a pilot project in Saunda mines, which is run by the 57-member Fisheries Co-operative Society. A similar repurposing of the mines in the Mandu block can be done.
- **Infrastructure buildout:** The development of the sector gives the opportunity to the district to develop the infrastructure of both the void and water bodies for the purpose of pisciculture, and also cold storage and warehousing for the development of the sector. Infrastructure can be built using DMF money initially, and also using the provision of Jharkhand Feed Processing

Industry Policy 2024.

- **Opportunity to develop inter and intra-state business model:** In the interview, it was observed that there is a huge demand for local fish in the nearby districts of Dhanbad and Bokaro, and also in the neighboring state of Bihar. The development of this sector can boost inter and intra-state business.

Recommendations

Block: Patratu and Mandu

- **Use local financial resources:** The district administration along with the CCL and state government's directorate of fisheries can explore the feasibility of creating void and cold storage facilities using CSR and DMF funds to promote pisciculture in the district.
- **Leveraging central and state government schemes:** The government scheme of Jharkhand Food Processing Policy can be used to create processing infrastructure, the scheme provides 35-50% subsidy for the development of cold storage facilities and other processing infrastructure. Similarly, fisheries extension services can be used for technological upgradation.
- **Skill development for processing of fish and capacity-building for product marketing:** A major skill gap is identified in the packaging and storage of fish produce. The district administration along with the skill development department and fisheries extension service can create a plan to provide skill development and skill enhancement for the local people. As the sector is unorganized, self-employed workers can also join the sector as the entry barrier is comparatively low. Interested candidates can use PMKVY training and join the sector. In addition, it is also observed that workers involved in fish production required capacity-building in the marketing of their product.

Table 8 : Sectors for diversification in Ramgarh

Aspiration base, comparative advantage and government and private support for potential sectors of diversification.

Sector	Aspiration base	Comparative advantage	Government/private support
<p>Tourism</p> <p>Focus blocks: Chittarpur and Patratu</p>	<p>Local enterprise</p> <p>Approximately 11% of industries identified tourism as a key sector for diversification. Among enterprises, 6% favored expansion into religious tourism, while 5% preferred natural tourism.</p>	<p>Presence of tourist spots</p> <p>Ramgarh is a captivating destination for its rich cultural and natural attractions. Highlights include Maa Chinnamastika Temple, Prachin Shiv Temple (an archaeological site), Patratu valley, and Ramgarh fort.</p> <p>Adequate infrastructure</p> <p>Ramgarh district's proximity to Ranchi (state capital) enhances its rail and air connectivity. It is also traversed by a national highway and shares borders with larger districts like Bokaro and Hazaribagh.</p> <p>Potential for Mine Tourism</p> <p>Ramgarh, an old mining district, hosts several coal mines that can be repurposed as eco-tourism sites. The Rajrappa OCP stands out due to its proximity to the highly visited Rajrappa temple, making it an ideal location to attract tourists and boost eco-tourism.</p>	<p>State policy support</p> <p>Jharkhand's Tourism Policy (2021) offers both fiscal and non-fiscal incentives, including investment support of up to ₹7.5 crore, relaxation in stamp duty and SGST, and streamlined approvals through a single-window clearance system.</p> <p>Leveraging the Central Government support</p> <p>The central government has set up schemes such as Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY), Pradhan Mantri Kaushal Vikas Yojana (PMKVY) which promote skill development and generate self-employment.</p> <p>CSR and DMF Money</p> <p>CSR money can be used to provide skill development for the local people. DMF money can be used to create the infrastructure including mines and eco-tourism.</p>
<p>Agro-based industry: Food processing</p> <p>Focus blocks: Gola and Dulmi (Food Processing) Mandu (Millets)</p>	<p>Local enterprise and household</p> <p>More than 40% of the enterprises want to diversify into forestry or agro-based industries.</p>	<p>Agriculture resource endowment</p> <p>Ramgarh boasts rich agro-resources, including paddy and vegetables like cauliflower, potato, and cabbage, with high crop intensity in Gola and Dulmi blocks. Its climate and soil are ideal for vegetables and millet. As a key regional vegetable supplier with strong rail and road connectivity, Ramgarh holds significant potential for food processing and truck farming.</p> <p>Favorable Conditions for Millet Production: Mandu in Ramgarh has ideal soil for millet cultivation, with a crop intensity of around 80%, allowing for the introduction of new crops.</p>	<p>State/district policy support</p> <p>Jharkhand's Food and Feed Processing Policy (2024) supports the establishment of ultra-food processing units in Gola, including potato processing and storage facilities, with potatoes designated as an ODOP. The policy also aims to boost millet production.</p> <p>The PM Formalisation of Micro Food Processing Enterprises (PMFME) scheme supports the creation of co-operative societies/FPOs, encourages shared food processing and storage infrastructure, and facilitates product branding and marketing.</p> <p>The National Millet Mission offers price support, promotes value addition, and generates employment.</p>

		<p>The presence of coal mines and abundant water resources supports irrigation, enhancing local livelihoods through increased millet production.</p> <p>Strong Transport Connectivity: Ramgarh District is well linked to major cities by road and rail, providing essential infrastructure that can attract investment. This connectivity is especially advantageous for food products, which have a short shelf life.</p>	<p>Assistance for agri-business development Jharkhand's MSME Policy (2022) emphasizes cluster development, offers 40% support on fixed capital costs, and establishes district-level MSME centers to promote local entrepreneurship.</p>
<p>OB to Sand</p> <p>Focus blocks: Mandu</p>	<p>Local enterprises and households Around 13% of the enterprises want to diversify to the non-coal quarrying sector.</p>	<p>Coal Waste to M-sand Coal waste (topsoil and overburden rocks) from opencast mines is crushed to produce sand. With a stripping ratio of 1.36-3.90 cu.m at Ramgarh OC, the high volume of overburden offers potential for repurposing and wealth generation in the Mandu block.</p> <p>Adequate infrastructure Ramgarh, located near several districts and Ranchi, a key real estate hub, benefits from strong rail and road connectivity to nearby markets, reducing transportation costs.</p>	<p>State/district policy support The Ministry of Coal is promoting OB-to-sand conversion. In the absence of state policy, other state case studies can be used to benefit M-Sand overall.</p>
<p>Pisciculture</p> <p>Focus blocks: Patratu and Mandu</p>	<p>Local enterprises: Around 21% of the enterprises express a preference for expanding into pisciculture as an important sector for diversification.</p>	<p>Demand for fish The major supply of fish comes from the southern state, which creates a gap in the fresh fish supply.</p> <p>Existing assets The presence of water bodies in Patratu, the opportunity for the repurpose of coal mines void, provide opportunities to enhance fish production.</p>	<p>Leveraging government support The Jharkhand Food and Feed Processing Policy offers incentives for cold storage infrastructure, promotes fish exports, and provides stamp duty relaxation.</p> <p>Jharkhand Fisheries Research & Extension supports fish seed production and skill training marketing.</p>

3.2 Bokaro

Bokaro, located in central Jharkhand, was formed in 1991 after the merger of land from now-neighboring Giridih and Dhanbad districts. It has a population of over 2 million. It is the fourth-highest coal-producing district in Jharkhand and home to three coal-fired power plants. The three thermal plants have a total capacity of 1.4 GW, and this capacity is currently undergoing expansion.

Coal production formally began in the 1910s with the operationalization of coal mines in the Bermo coalfield. Today, mining and quarrying contribute around 7% to Bokaro's GDP and 39.30% to Bokaro's primary sector, compared to a statewide average of 5.71% to the GDP and 22.64% to the primary sector.

Coal production is carried out entirely by CIL's subsidiary CCL. Bokaro has 14 coal mines and produced 14.24 MT of coal in F.Y. 2023-24. Twelve of these mines are open-cast and the other two are underground with a total project capacity of 33.80 MT.

Table 9 : List of Coal Mines and Production in Bokaro

The table provides details of the operational coal mines in Bokaro, including total land area, project capacity, mineable reserves, and total production as of 2023.

Name of the mine	Total Land (in Ha)	Project Capacity (MTPA)	Total Mineable reserve as on 01.04.22 (MT)	Total Production in 2023-24 (MT)
Karo OC	540.95	11	79.34	1.32
Konar OC /Khas Mahal OCP	563.05	8	77	5.36
Bokaro OC	190	0.8	20.3	0.32
Kargali OC	107.5	0.35	10.914	0.00
SD OCM	311.14	2.25	21.5	1.86
Amlo (AAD) OC	231.92	2.5	27.5	2.61
Tarmi OC	213.7	1	7.63	0.00
Pichri OC	182.44	1.2	18.99	0.00
Dhori Khas UG*			0.87	0.14
Kathara OC	797	1.9	20	0.42
Jarangdih OC	223.15	1.5	15	1.48
Govindpur Ph II OC	470	2.5	34	0.94
Govindpur UG	146	0.8	4.3	0.02

Source: Data collection from CCL, Headquarter in January 2022

* For Dhori Khas UG Project Report was not available, Total land and project capacity is missing

In addition to the coal sector, Bokaro is also home to one of the oldest and largest steel plants, operated by Steel Authority of India Limited (SAIL). Due to the presence of the steel sector and coal in the region, Bokaro is also a major industrial center in the state.

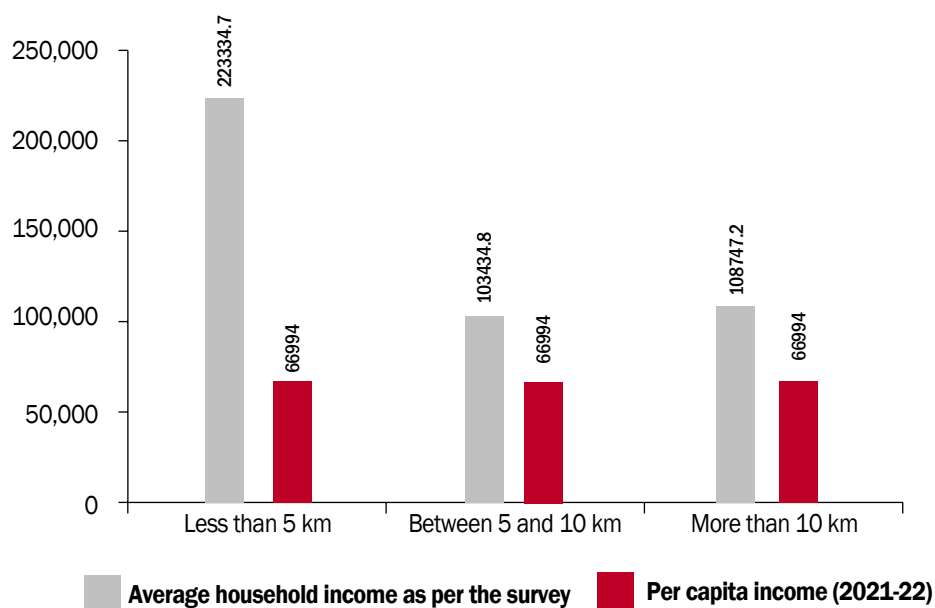
Household profile

The average household size of the district was 4.93 persons which is lower than the census 2011 household estimate of 5.22. The average household income is USD

1894 (INR 1,60,990) as compared to the per capita income estimates of USD 801.39 (INR 66,118).

Figure 22: Bokaro's per capita income (2021-22) and average household income as per the survey

This figure compares Bokaro's per capita income for the year 2021-22 with the average household income reported in the survey, highlighting the income disparities at the individual and household levels.



Source: PCI according to the Jharkhand GDDP report (2021-22)

In terms of living arrangements, while 56% of the households live in pucca houses, 48% live in kaccha, or semi-pucca houses. While 55% of households own land, 45% don't own any. Among those who own land, 61% have agricultural land and 21% have non-agricultural or commercial land.

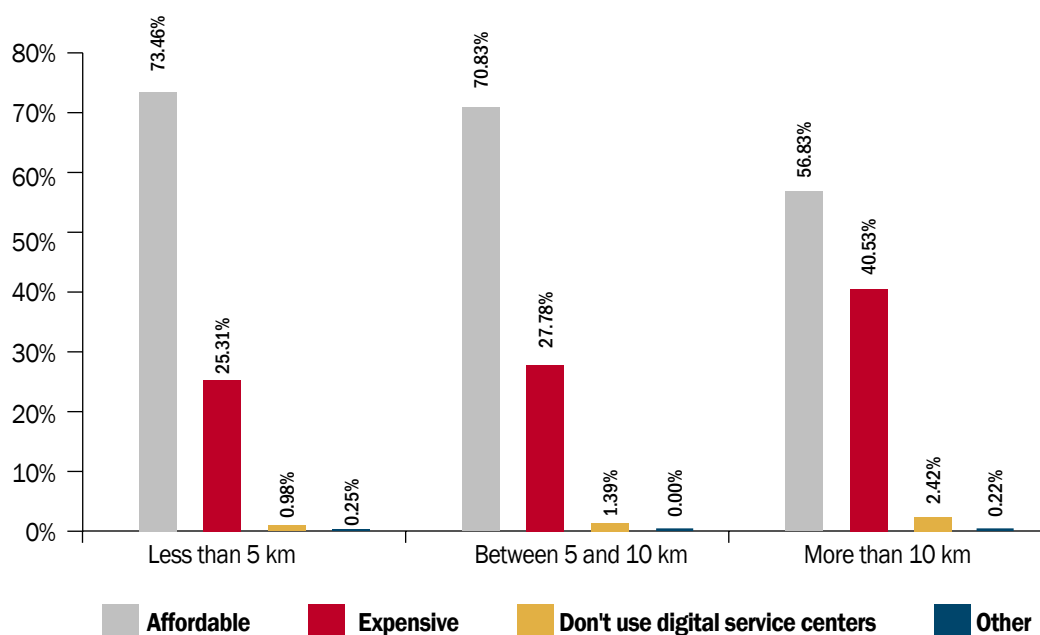
Apart from locals who have an ancestral home in Bokaro, 25% of households reported to have migrated to Bokaro for work in coal mines and TPPs as per our survey. Agriculture work was another major reason for migration for 17% of the households. As for decision-making, 70% of the respondents take major decisions of the household. While 19% of the respondents rely on their spouses, 5% rely on their father or father-in-law for all important decisions.

In 2023, 15.28% of Bokaro's population is estimated to be multidimensionally poor. In our survey, 51% of the households are red card holders, and 19% are priority household card holders. Only 3% rely on the Antyodaya Anna Yojana ration, and 17% do not use a ration card.

In terms of digital service accessibility, 51% of households have at least one member with a smartphone. Of these, 78% of households know to operate a smartphone at the basic level. As for affordability, 66% of households find the digital service centers in Bokaro affordable.

Figure 23: Affordability of digital service centers in Bokaro

This figure illustrates the affordability of digital service centers in Bokaro, showing the extent to which residents find these services financially accessible across all buffers



Industrial profile

We surveyed 150 registered enterprises in Bokaro in all 9 blocks of the district, with a major concentration in Chas and Bermo blocks. Our sample consists of 77% of enterprises from urban areas, while 23% are from rural areas. The average distance of these enterprises from coal mines is about 21.2 km. While 83% of the enterprises are sole proprietorships, 10% are partnerships. Among the enterprises, only 18% have women owners. Overall, we covered enterprises that were started between 1964 to 2023.

Table 10: Sectoral distribution of registered enterprises in Bokaro

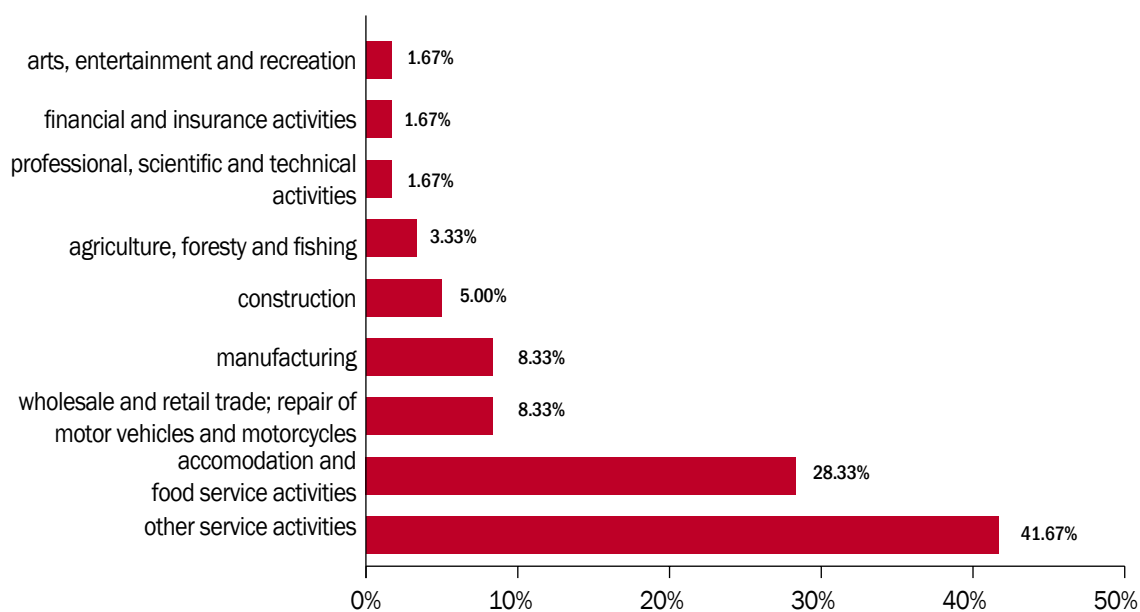
The table presents the registered enterprises surveyed in each block of Bokaro, categorizing them into coal and non-coal enterprises based on the availability of businesses in the area.

	Primary coal	Primary non-coal	Secondary coal	Secondary non-coal	Tertiary coal	Tertiary non-coal
Bermo	1	1	0	2	13	5
Chandankiyari	0	3	0	0	0	1
Chandrapura	1	1		1	1	0
Chas	0	1	22	33	4	39
Gomia	0	0	0	0	2	0
Jaridih	0	3	5	2	0	4
Mandu	1	0	0	0	0	0
Nawadih	0	0	1	0	0	0
Petarwar	0	2	0	0	0	1

We surveyed another 60 unregistered enterprises in 7 blocks of the district; with a concentration in Chas, Bermo and Chandankiyari. While approximately 42% of these enterprises are engaged in small service and retail activities, 28% are in accommodation and food services, collectively forming the majority of the sample. The highest education level for 40% of the enterprise owners is 10th standard; and the majority of the owners have been running the business for over 20 years.

Figure 24: Sectoral distribution of unregistered enterprises in Bokaro

This figure shows the sectoral distribution of unregistered enterprises in Bokaro, highlighting the industries in which these enterprises are primarily engaged. The largest sectors include services, accommodation, and food services.



3.2.1 Coal dependency in Bokaro

Livelihood

Bokaro is highly coal-dependent for employment, which manifests in three key ways:

1. Direct: Employment in the coal mines as departmental or contractual workers.
2. Indirect: Employment in ancillary industries that use coal such as thermal power plants, brick kilns, employment, etc,
3. Induced: Households engaged in business that depend on the coal sector in two ways:
 - i. Providing services to the coal sector in a B2B set-up, and;
 - ii. Customers availing the business service are coal sector employees.

Based on our survey, within a 5 km radius of the mine, 12% of the households are directly working in coal mining, while 4% work in thermal power plants.

Our FGDs and discussions suggest actual estimates; CCL provides direct jobs to 9,924 people. Apart from direct employment, approximately 5,000 contractual work-

ers are employed in coal mining operations. Approximately 100,000 additional people in the district are employed in coal transportation and manual coal loading. The thermal power plants in Bokaro provide jobs to over 1,800 people. The Damodar Valley Corporation's two plants provide jobs to 1,325 people; the Tenughat Thermal Power Station employs roughly 550.

Table 11 : Wage Payment to direct CCL employees for 2023-24 in Bokaro

The table presents the wage payment CCL made to the people directly employed on their payroll. The table gives the estimate of contribution CCL workers made to the local economy

Item	Amount in (INR)	Amount (USD)
Salary, Wage Allowance etc (Cr./Million)	5240.02	616.47
Contribution to PF and Other Fund	746.85	87.86
Gratuity	141.51	16.65
Leave Encashment	308.82	36.33
Others	425.6	50.07
Total Employee benefit	6862.8	807.39
Total Workforce in CCL (number)	34483	NA
Total Workforce working in Bokaro (Number)	9924	NA
For Induce Economy Calculation		
Salary, Wage Allowance etc	5240.02	616.47
Per Employee wage in CCL	1519589.363	17877.52192
Total Wage payment by CCL in Bokaro (Crore/Million)	1508	177.41

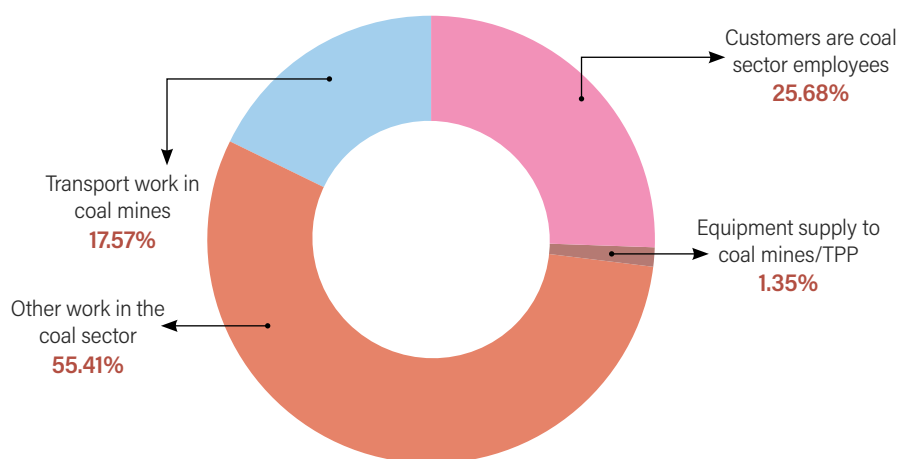
Assumption: For expenditure in the local economy only Salary wage is taken into consideration

Note: Wage payment to outsourcing or contractual workers are not considered in this calculation.

Source: CCL Annual Report 2023-24

Figure 25: Type of coal dependency among registered enterprises in Bokaro

This figure illustrates the extent of coal dependency across various registered enterprises in Bokaro, highlighting the proportion of businesses involved in equipment supply, coal transport, induced economy and other coal-related activities.



The coal sector fosters large induced economies around the mines that cater



If coal production stops, lakhs of people will become unemployed. My project employs around 900 people; one project employs around 2,000 on average. Then, you can also include their families, who are indirectly dependent on coal

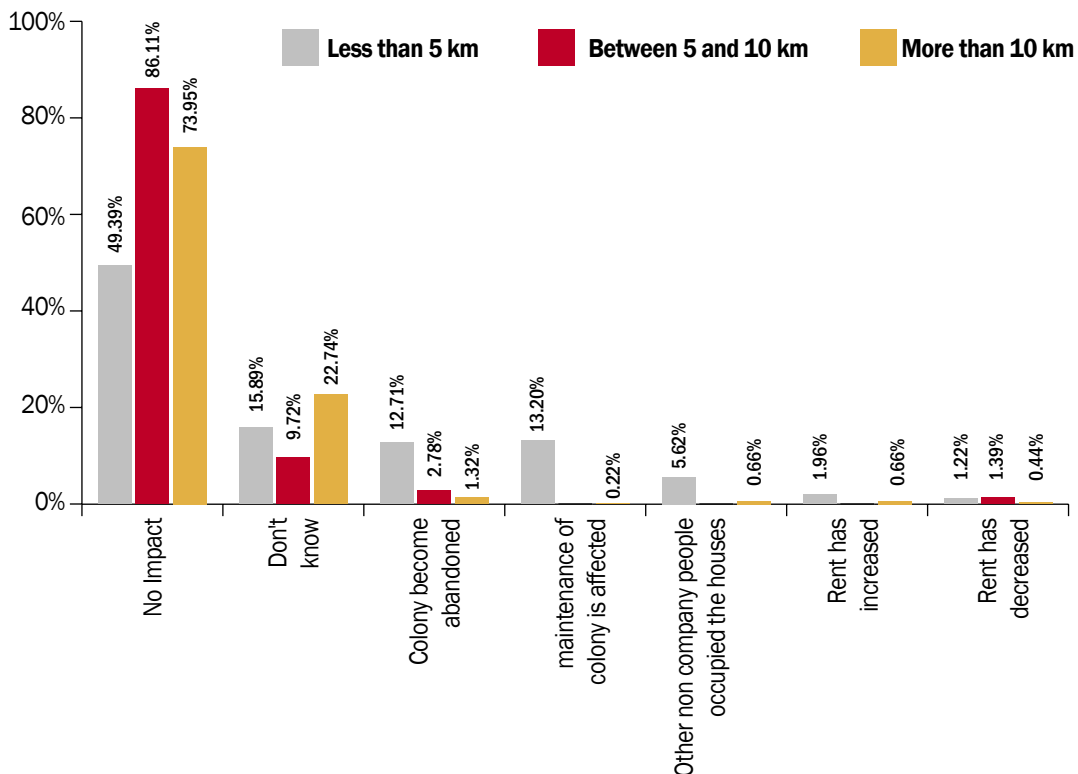
Focus group discussion with departmental CCL workers

to local miners and support mining operations. In the district, around 9924 people are employed in CCL direct employment; CCL paid INR 1,508 crore in F.Y. 2023-24 to their employee working in the Bokaro district as the wage payment. These people spend their money in the local economy which creates a multiplier effect, creates livelihood and increases the sale of products. As per this report's field survey, roughly 110,000 people hold coal-induced employment. Of these laborers, 10,000 work at the Bokaro Steel Plant, which provides some of the highest quality coal-induced employment in the district. Among all the administrative blocks, Bermo has most benefited from the spending of coal miners in the local market, as out of these INR 1,508 crore, roughly INR 1,000 crore is paid to the people working in the coal mines of Bermo block, and the businesses are largely dependent on the coal money for their

revenue. Therefore, the dependency on coal is observed to be the highest in the Bermo block.

Figure 26: Impact of coal mine closure on housing in Bokaro

This figure illustrates the impact of coal mine closures on housing in Bokaro, focusing on changes in colony maintenance and variations in house rents.



Social infrastructure

Our survey reveals that 55% of registered enterprises are engaged in various activities within the coal sector. Additionally, 25% serve customers who work in the coal industry, while 17% are directly involved in coal transportation. Among unregistered enterprises, a significant 72.3% have the majority of their customers employed in the coal sector.

Housing

In our survey, 85% of respondents live in houses they own, while only 2% live in rented spaces. Of those who rent, 10% reside in facilities provided by either the coal company or thermal power company. Within this category, 4% are coal employees living in quarters within a 5 km radius of the mines provided by CCL. Our FGDs with outsourcing workers in Bokaro who avail CCL housing facilities substantiates our findings.

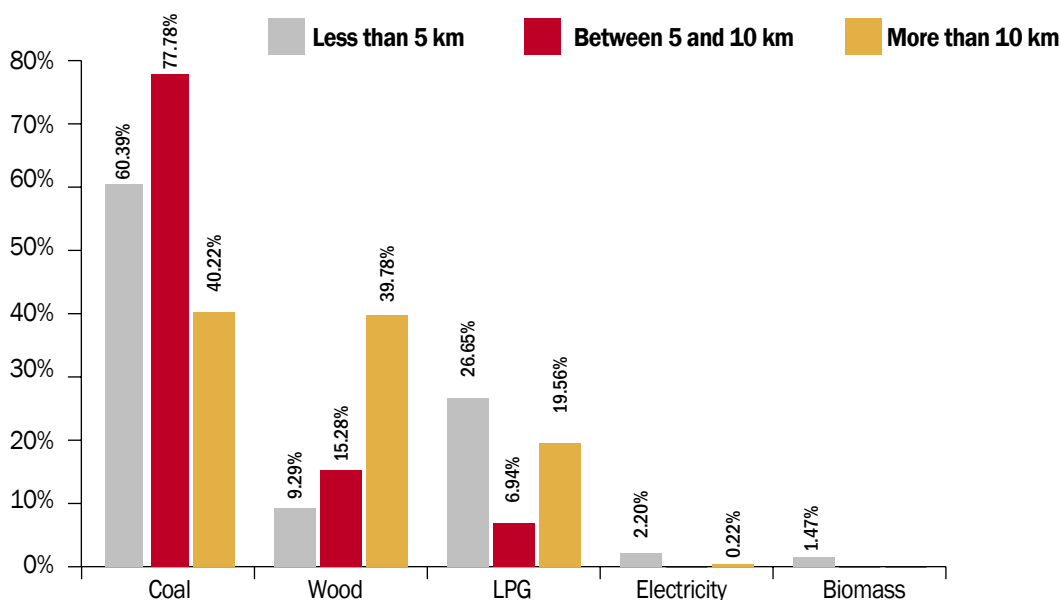
Previous mine closures have impacted the upkeep of the housing facilities. While 5% of the respondents reported that maintenance of the colony has been affected, 6% reported that the colonies became abandoned. As mentioned in section 3.1.3, Bokaro also faces the problem of colony quarters being occupied illegally. In this context, 3% of the respondents reported that these quarters were occupied by non-CIL people.

Cooking fuel

Coal is extensively used for cooking in Bokaro. Overall, 52% of the households use coal as primary cooking fuel. The majority of the households using coal fall within 5 km of the mines as coal is more accessible (locally) near the mines. Other major sources of fuel used are wood (24.5%) and LPG (21.6%). Only 1% of total households use electricity for cooking. Our FGDs with informal workers who use coal as cooking fuel also delineates this usage.

Figure 27: Type of cooking fuel used in Bokaro

The majority of households across all three buffers use coal as their primary cooking fuel. The use of other fuel options, such as LPG, wood, electricity, and biomass, is relatively low.



“

Around here everyone uses coal. They don't use gas here. Coal is free.”

Focus group discussion with informal workers in Bokaro.

The informal economy, especially coal sellers, play an instrumental role in supplying coal to local households and businesses in Bokaro. Based on our survey, while 62% of the households using coal as cooking fuel purchase it from cycle sellers, 37% self-procure it from the mines. A majority of the households within 5 kms of the mines get their coal from the mines.

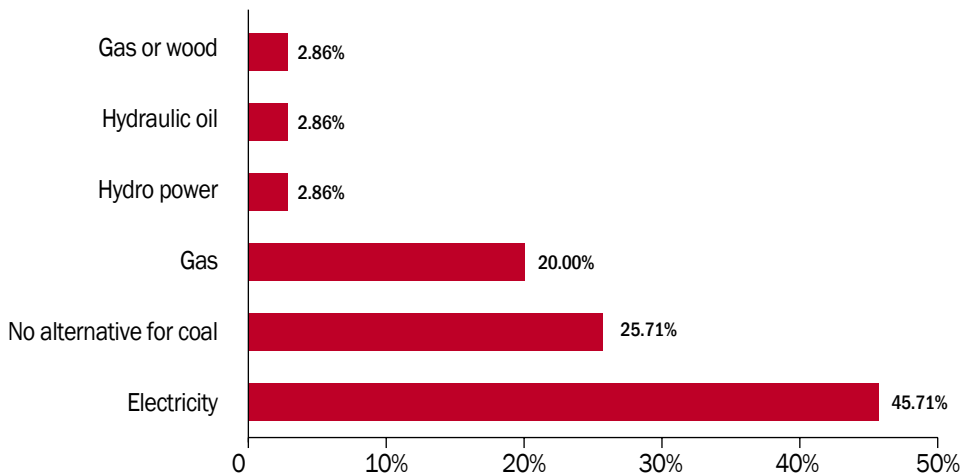
Coal-based boilers

Overall, 23% of the sampled registered industries use coal-based boilers. Within this, the majority of enterprises using these boilers fall in the manufacturing sector. In the event of non-availability of coal, while 46% of registered enterprises would prefer using electricity, 20% would switch to using gas. However, 26% of the sampled registered enterprises perceive that there is no alternative to coal.

Among unregistered enterprises, 18% of units use coal-based boilers. Most of these businesses are engaged in food and accommodation activities; and procure coal locally from the market.

Figure 28: Use of other sources in coal-based boilers in case of non-availability of coal in Bokaro

This figure illustrates the alternative sources used in coal-based boilers when coal is unavailable, highlighting the options for maintaining operations. The majority of enterprises prefer switching to electricity as a substitute.



Electricity and water supply

Bokaro gets nearly all of its electricity from coal-fired power. The district has an installed capacity of 1.42 GW of coal-fired generation which not only provides electricity to the district but also comprises more than 26% of Jharkhand's total installed thermal power capacity.²⁶ Coal companies are also instrumental in supplying electricity for household and industrial use.

Based on our survey, while 66% households use state-provided electricity connections, 22% avail CCL electricity connection. As part of its mandatory CSR spend-

ing, CCL provides electricity connections to households within about 25 km of the coal mines. State-supplied electricity is the major source for industrial purposes, too. While 84% of registered enterprises use state supplied electricity, only 33% of unregistered enterprises avail such connections. Power outages are a concern as 24% of registered enterprises experience such power cuts for approximately 8 hours a day. However, the majority of unregistered enterprises experience such outages for no more than 5 hours a day.

CCL provides water supply to its colony and the area which falls under its CSR purview. In the district, CCL provides roughly 5.35 MGD water per day.²⁴ In terms of water supply, 15% of households avail CCL-supplied tanker or tap water. Within this category, 95% of households reside within 5 km of the mines. Tubewells are the most common water source among households beyond the 10 km radius of the mines.

Like Ramgarh, Bokaro's main source of water for industrial activities are hand-pumps and wells; 86% of registered enterprises and 63% of unregistered enterprises use these sources. Coal company-supplied water is not a popular source of water as only 4% of registered enterprises use such sources. Past mine closures have impacted the water supply in the areas around the mines. While for 8% of the households CCL stopped the water supply, for 5% of the households the water supply improved as the state provided alternative sources of water.

Overall, for diversification purposes, 60% of registered enterprises, and 51% of unregistered enterprises perceive that they have adequate water and electricity to diversify into other businesses.

Figure 29: Household Electricity sources in Bokaro

This figure illustrates the sources of electricity for households in Bokaro, highlighting the distribution of electricity from various providers, including state connections, private suppliers, and others. CCL-supplied electricity is predominantly used in the 0–5 km buffer zone.

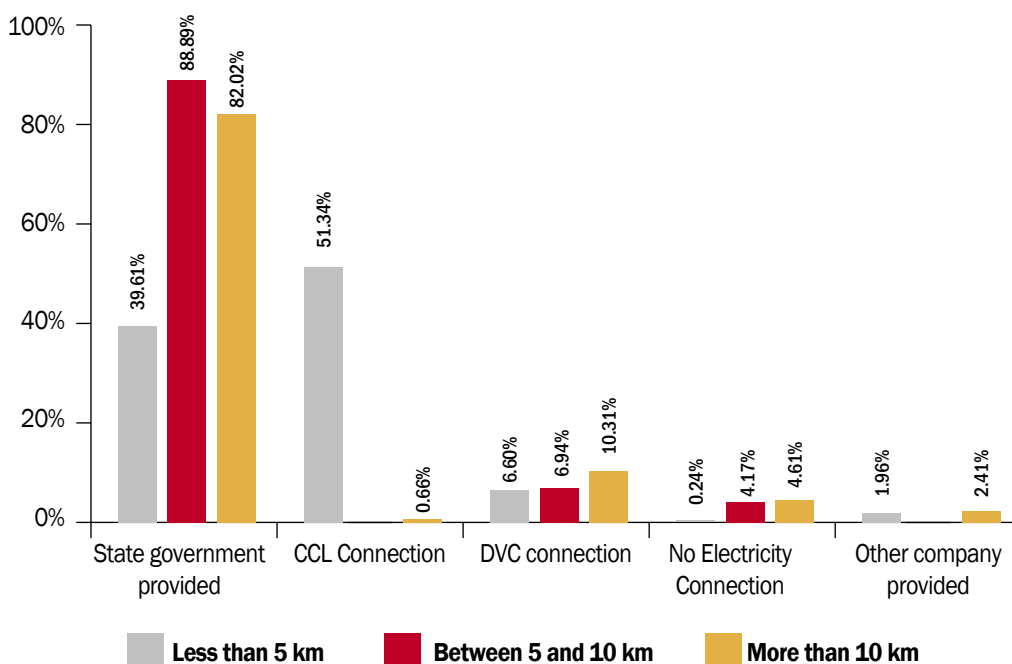
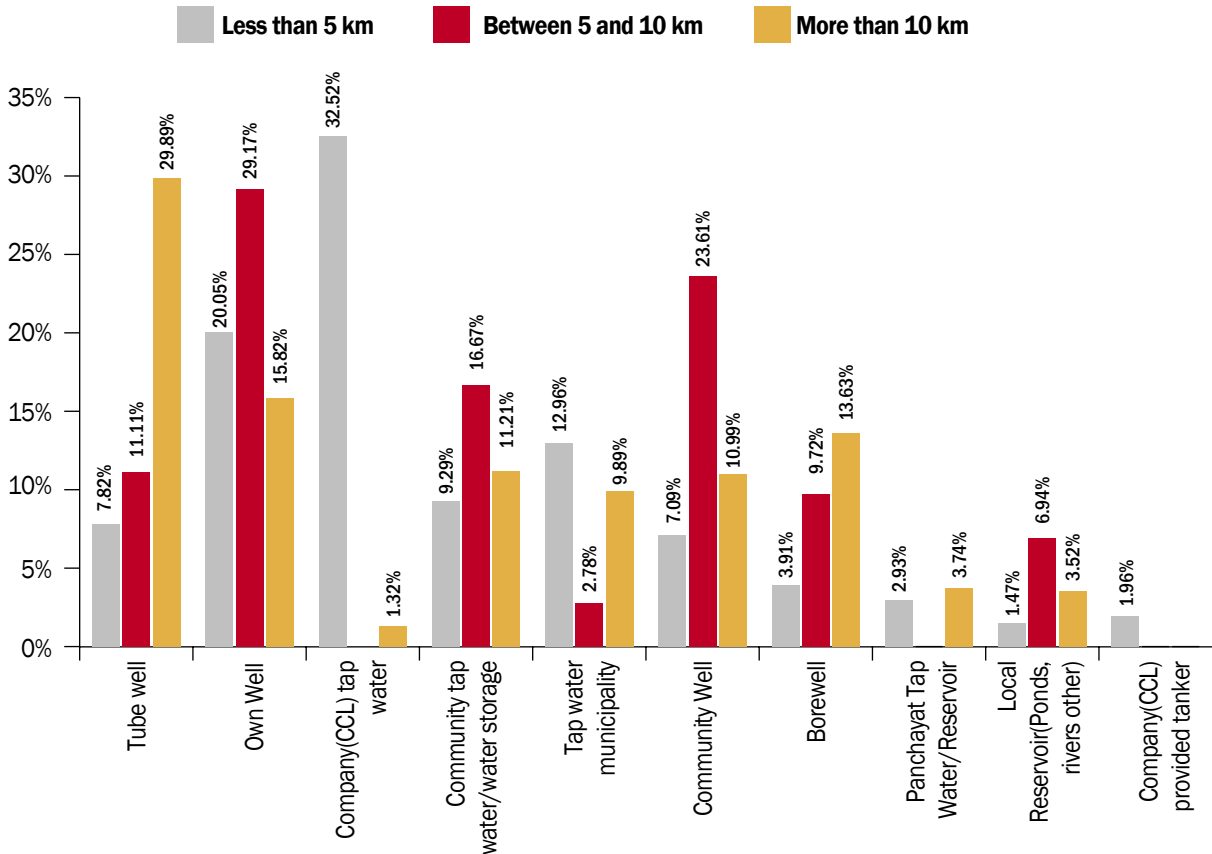


Figure 30: Type of household water sources in Bokaro

The figure shows the sources of water for households. The majority of households across all buffers rely on wells and taps for their water supply. However, a highest majority of households availing CCL water connections predominantly lie in the 0–5 km buffer.



Health and education facilities

Apart from government support, coal and thermal companies provide healthcare facilities in Bokaro. Overall, 35% of respondents use government facilities, 28% use private hospitals, and 22% go to local clinics for medical needs. All households availing health services at CCL hospitals reside within 5 km of the mines. Beyond 10 km of the mines, most households (37%) avail services at private hospitals, followed by government facilities (31%), and local clinics (28%). Our FGDs with outsourcing employees in Bokaro substantiates our findings about medical facilities provided by CCL.

“
Our job is directly dependent on coal. If the population moves out, the hospital will not function. In that case, there would be no jobs for us

Focus group discussion with outsourcing workers in Bokaro

Based on the survey, 56% of households have at least one member with medical insurance. Of these, 85% have *Ayushman Bharat* medical insurance. Overall, only 9% of households avail medical insurance provided by CCL.

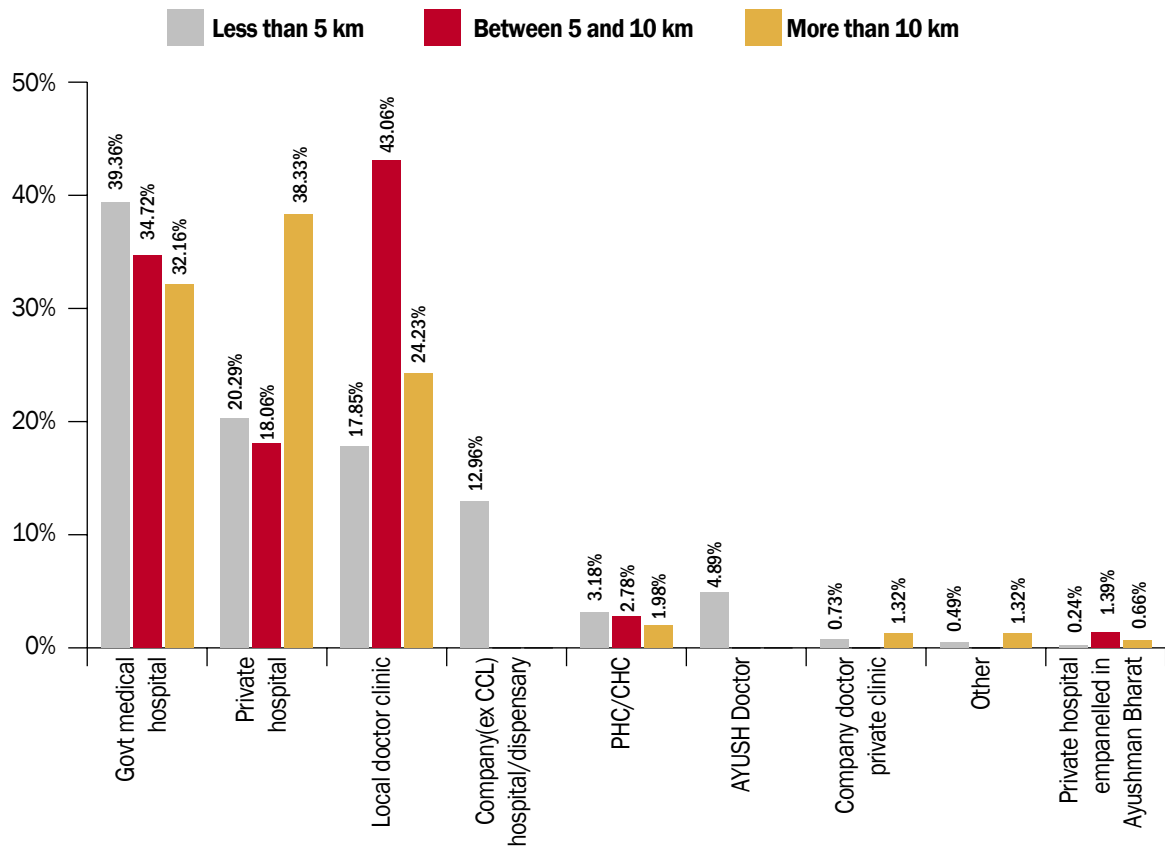
For 8% of households, previous mine closures improved the healthcare facilities as new state-run hospitals and dispensaries opened in the areas. However, the immediate impact of mine closures has been the

closing down of CCL facilities and increased cost of healthcare.

In terms of educational facilities, CCL plays a significant role in supporting education in Bokaro. The company runs three Dayanand Anglo Vedic (DAV) schools in the district, each serving an average of 2,000 students.²⁶ These schools are part of CCL’s broader commitment to corporate social responsibility, particularly in providing access to quality education for children in coal-dependent communities.

Figure 31: Type of health facilities availed in Bokaro

The figure illustrates the types of medical facilities accessed by households in Bokaro, with the majority relying on local clinics or government medical hospitals. The use of CCL hospitals is primarily limited to households within the 0–5 km buffer zone.



Fiscal dependency

Bokaro has the fourth-highest DMF collections in Jharkhand by district. As of 2023, total DMF accrued from coal in Bokaro amounted to USD 125 million (INR 10.62 billion).⁴³ Coal DMF collections play a major role in development of critical road infrastructure in Bokaro, and over 645 such projects worth USD 106 million (INR 9.01 billion) have been sanctioned since 2016.⁴⁴ Coal also generates significant indirect revenues that are redistributed to the districts, including Bokaro. This is identical to Ramgarh’s dependence on government revenues.

CCL contributes to several development projects related to health, education and physical infrastructure in Bokaro as part of its CSR. For the year 2022-23, CCL approved 72 projects in the district with a total project cost of INR 5.7 crores (USD 0.6 million)²⁹. Additionally, the total GST compensation cess levied at INR 400 (ap-

proximately USD 4.62) per ton of coal production amounts to a substantial INR 569.6 crore (around USD 6.86 million) for Bokaro. This cess is a crucial source of revenue for the district, providing significant financial resources that support local and state-level economic development.

Diversification potential

Bokaro is known as a manufacturing hub, with the sector accounting for roughly 40% of the district’s GDP. However, much of this manufacturing activity is closely tied to coal, highlighting the region’s dependence on the coal industry. As the district looks to diversify its economy, transitioning away from this reliance on coal will be a key challenge, requiring investments in alternative industries and the development of non-coal-based infrastructure.

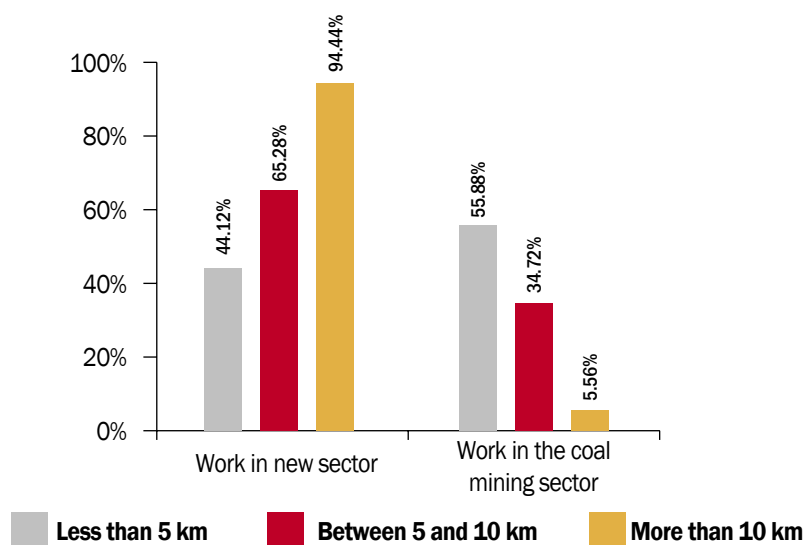
Aspirations

The aspirations for diversification in Bokaro are assessed in three ways: 1) Aspirations of households for their children; 2) Preferences for sectors for diversification in the event of coal mine closure, and; 3) New sectors that can come up for economic diversification.

Within a 5 km radius of the mines, while 55% of households want their children to work in the coal sector, 44% aspire for their children to work in non-coal sectors. Beyond 10 kms of the mines, however, while 94% of households want their children to work in sectors other than coal, only 5% still want employment in coal mines or related sectors for their children.

Figure 32: Household-level aspirations for children in Bokaro

This figure illustrates household preferences for coal and non-coal sector employment opportunities for their children. The majority of households in the 0–5 km buffer still prefer their children to work in the coal sector, while beyond 10 km the households prefer non-coal sectors for their children.

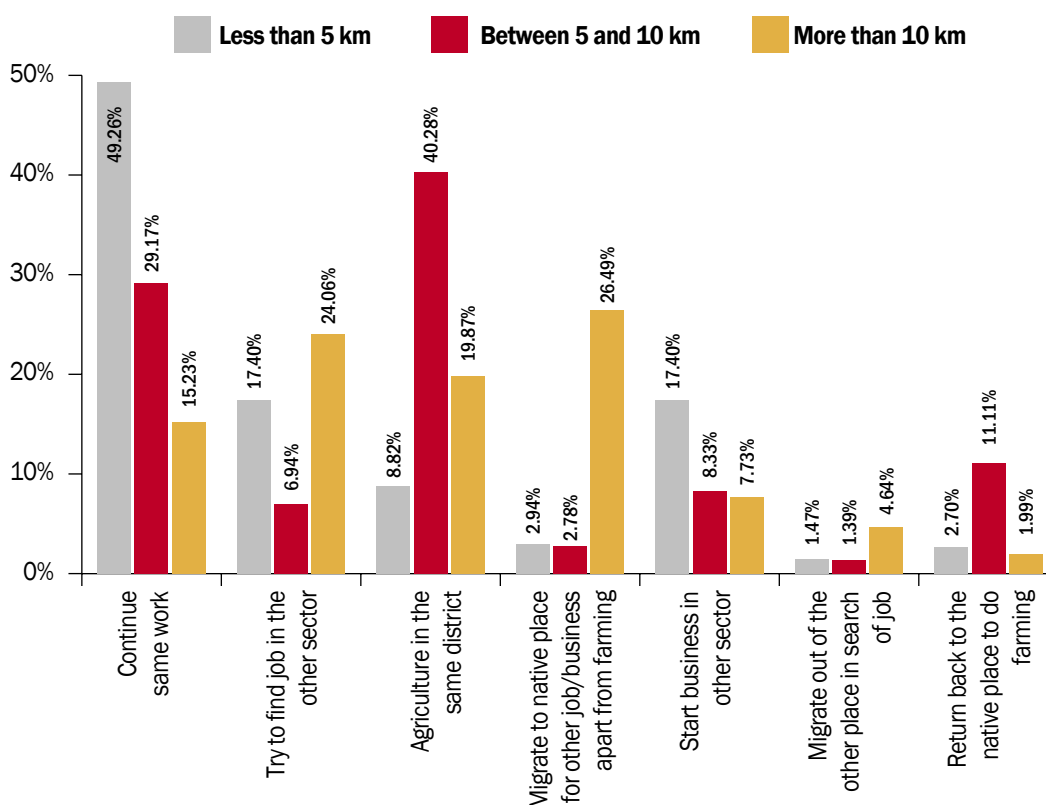


In the event of coal mine closure, the households elaborated on a host of options that they want to exercise. Overall, while 19% of households would prefer moving to

other sectors in Bokaro, 31% would still prefer doing the same work. Around 17% of the households would prefer to migrate either to a place around Bokaro or back to their native place in search of jobs. Moving back to practicing agriculture is also a preference for 16% of households.

Figure 33: Livelihood avenues for households in Bokaro

The figure illustrates the livelihood options households are most likely to pursue in the event of a coal phase-down. While households not directly impacted by the phase-down would likely continue their current occupations, those affected prefer transitioning to agriculture, starting a new business, or exploring alternative professions.



Preferred sectors for households

We asked about alternative sector choices in the event of mine closures at two levels: 1) Sector the household members would want to work in, and; 2) Sectors that Bokaro can diversify into.

Overall, the computer and IT sector is the preferred choice of work for 45% of households in all three buffer zones. Within a 5 km radius of the mines, 9% of households also prefer non-coal transport and non-coal MSMEs like textiles and pharmaceuticals as viable options for alternative livelihoods. Only 12% of households would prefer moving to the renewable energy sector as an alternative choice. Most of these households reside beyond 10 km of the mines.

There are several possible sectors for diversification. Overall, 24% of households perceive textiles as the major sector that can be set up in Bokaro. This is primarily because a number of workers from Bokaro migrate to other states for work in textile units.

Figure 34: Alternate sector choices of households in Bokaro

The figure shows the preferences of households engaged in business. The majority of these households would prefer to transition to the computer/IT sector.

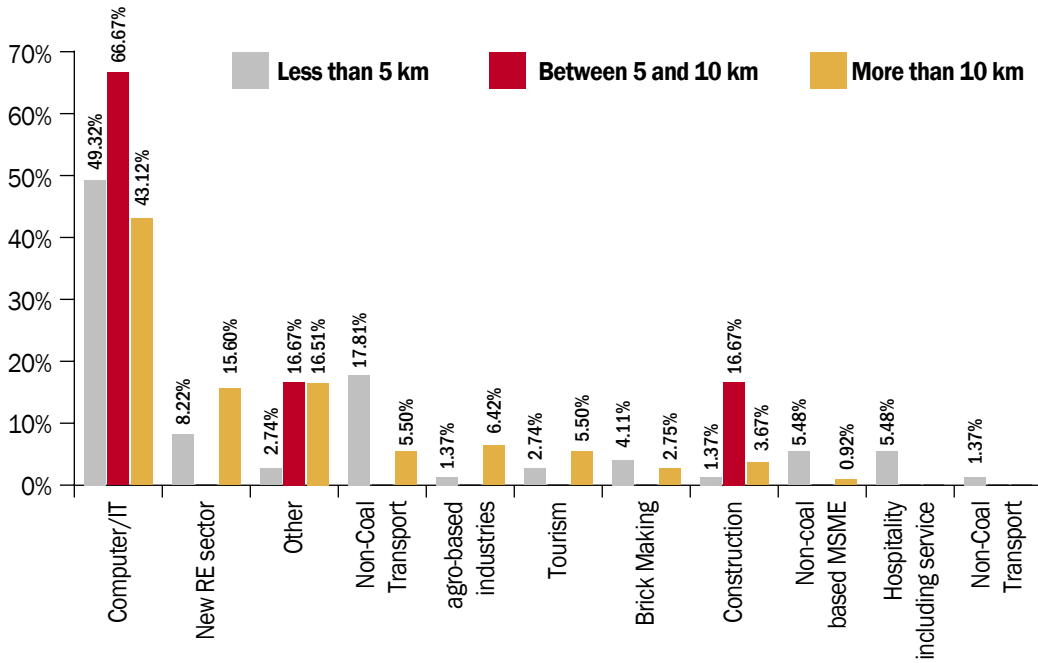
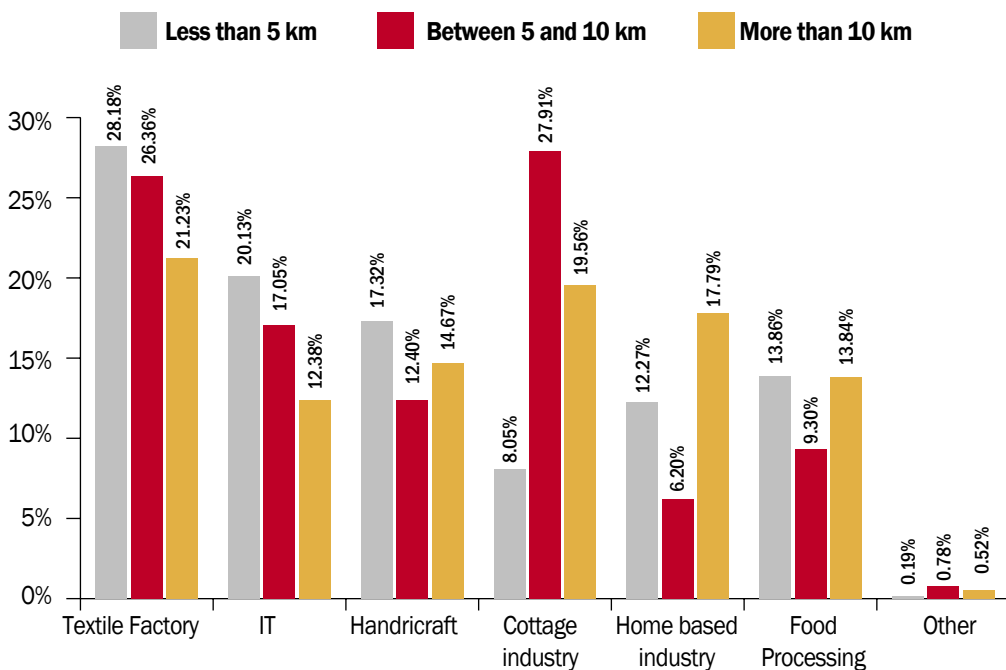


Figure 35: Preferential Sectors for diversification of household businesses in Bokaro

This figure highlights the sectors for diversification in Bokaro, showcasing the industries households perceive as the most viable alternatives to coal-related activities. The textile and cottage industries emerge as the top sectors for diversification.

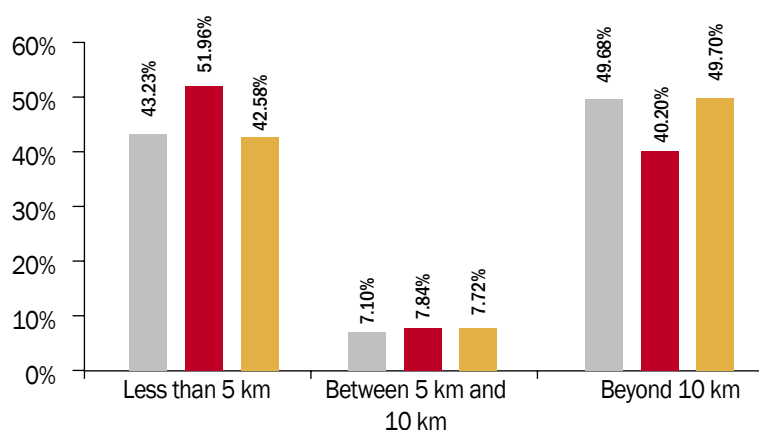


Therefore, they perceive that setting up textile units in Bokaro would provide them with employment opportunities based on their skillset. The IT sector is also a

preferred sector for economic diversification according to 16% of households. Other sectors for diversification as reported by the households include cottage industries, food processing, and home-based small businesses.

We assess the households' literacy and affordability of digital services, and their perception about digital services as a means of employment. In Bokaro, 83% of households accessed digital services through local CSC centers. In terms of creating employment through such services, 43% of the households see it as having scope in Bokaro.

Figure 36: Perception of employment through digital services in Bokaro

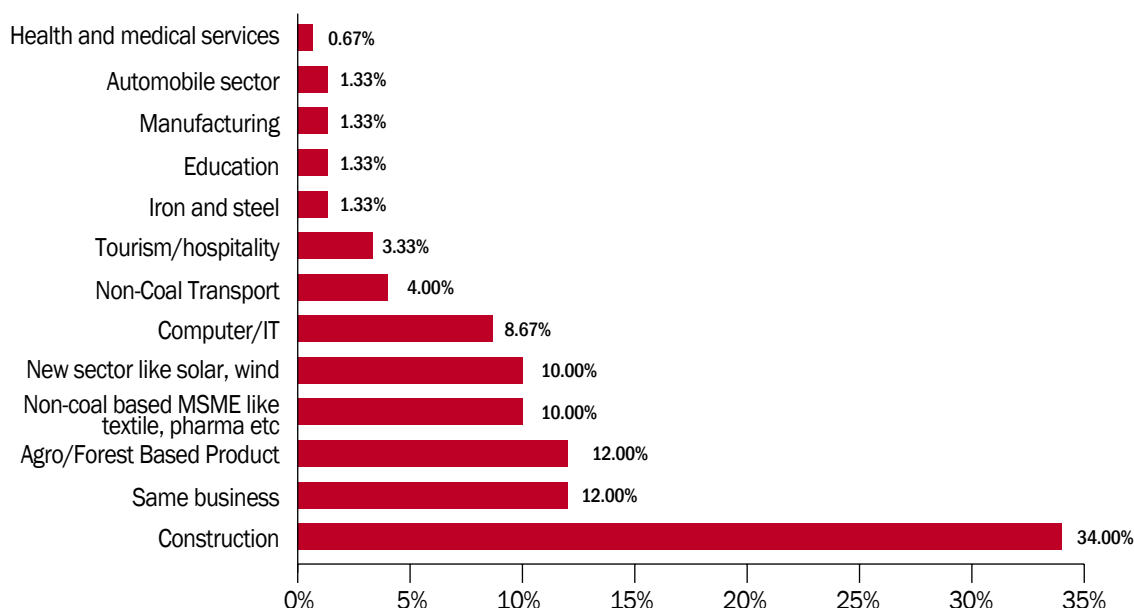


Preferred sectors for industries in Bokaro

Enterprises in Bokaro have varied preferences for diversification. Around 34% of registered enterprises prefer shifting to the construction sector.

Figure 37: Preferential sectors for registered enterprises in Bokaro

The figure illustrates the diversification preferences of registered enterprises into non-coal-related sectors. The majority of enterprises favor transitioning to construction or forest-based industries, or non-coal based MSMEs.



Another 12% would prefer continuing with the same business; unwilling to diversify. Other sectors of preference for diversification include agro and forest-based industries, non-coal based MSMEs, and the renewable energy (RE) sector.

For the majority of unregistered industries, agro-based or forest-based industry or construction are the sectors for diversifying.

Figure 38: Preferential sectors for unregistered enterprises in Bokaro

The figure illustrates the diversification preferences of unregistered enterprises into non-coal-related sectors. Agriculture and forest-based products, construction or computer/IT sector are the top priority sectors.

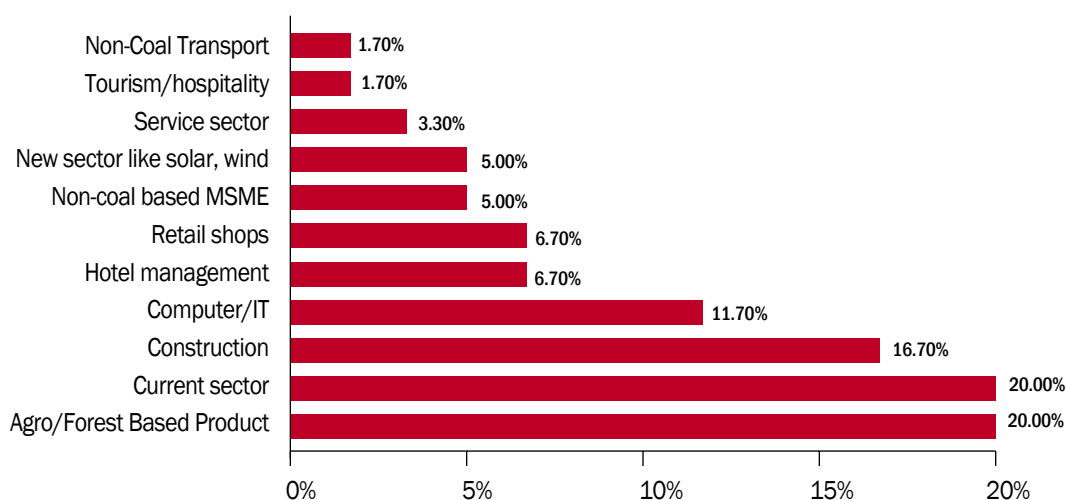
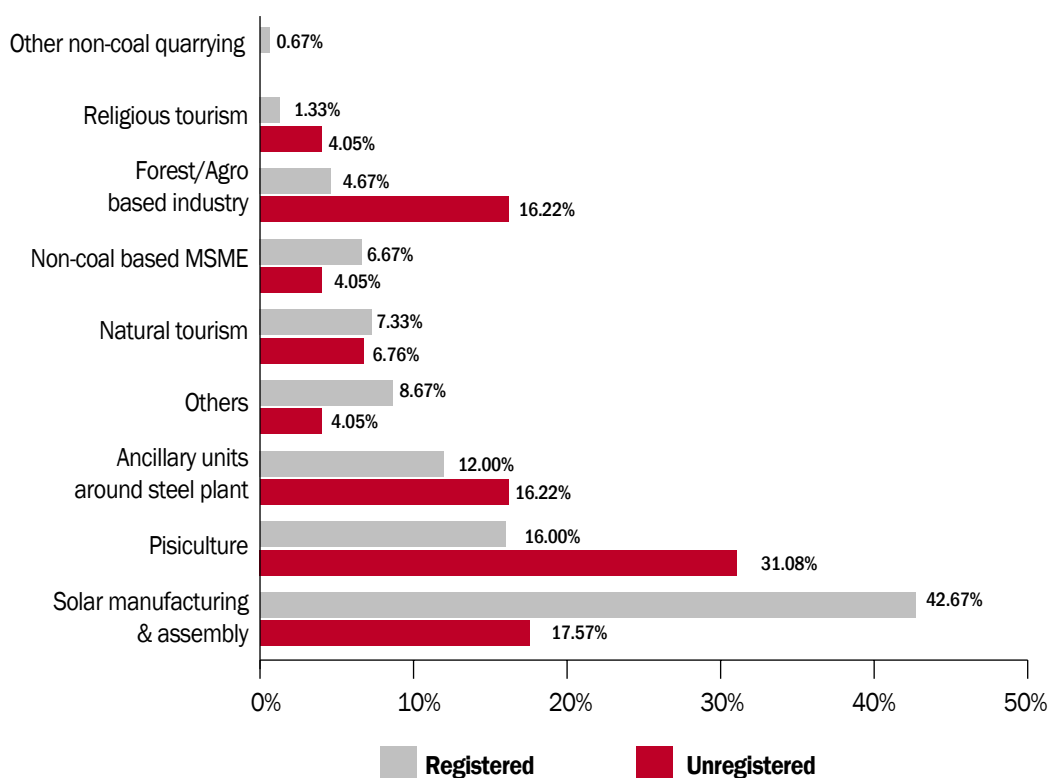


Figure 39: New sectors for diversification in Bokaro

The figure illustrates the strategic sectors for Investment in the district based on insights from the enterprise survey.

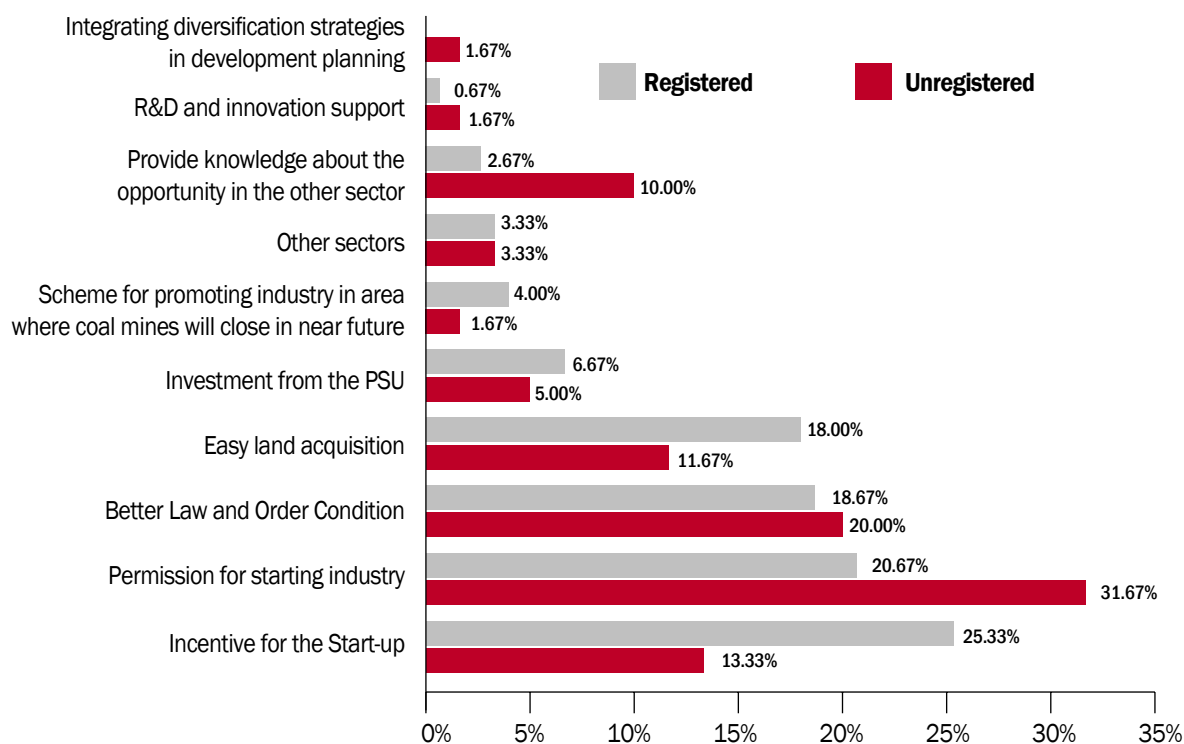


Institution

While Bokaro has economic advantages due to these industries around coal and steel, there's a pressing need to diversify its economy, especially given the environmental and economic challenges associated with heavy reliance on coal. Local enterprises in Bokaro would benefit from institutional support to facilitate such diversification. A majority of these enterprises, both registered and unregistered, want permits for starting new industries or incentives for start-ups. Additionally, there is a growing demand for improved law and order conditions, with clearer and more supportive regulations to facilitate the transition to sustainable and diverse sectors.

Figure 40: Institutional support needed for diversification in Bokaro

This figure illustrates the institutional support required for diversification in Bokaro, highlighting the key areas where enterprises seek assistance, such as incentives for start-ups, better law and order conditions and easy land acquisition.

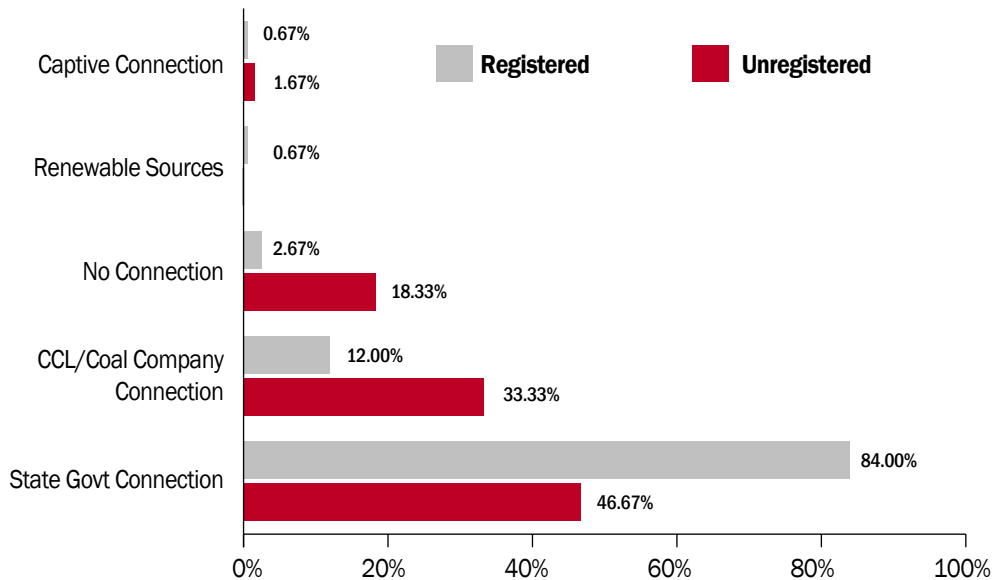


Infrastructure

Infrastructure development is crucial for the successful economic diversification of coal-based enterprises in Bokaro. In coal-dependent regions of India like Bokaro, coal companies have become central to addressing infrastructure needs, particularly in providing essential services such as electricity and water supply. According to our survey, approximately 60% of registered enterprises and 52% unregistered enterprises in Bokaro report having adequate infrastructure for diversification. However, the remaining enterprises face challenges that hinder their growth and diversification prospects. Currently, 12% of the registered and 33% of unregistered enterprises use electricity provided by CCL. In the event of coal mines closure, 63% of registered and unregistered enterprises perceive that infrastructure will deteriorate.

Figure 41: Source of electricity for enterprises in Bokaro

This figure illustrates the sources of electricity for enterprises in Bokaro, showing the distribution of supply from various providers, including state connections, private suppliers, and others. The majority of enterprises rely on state government electricity connections.

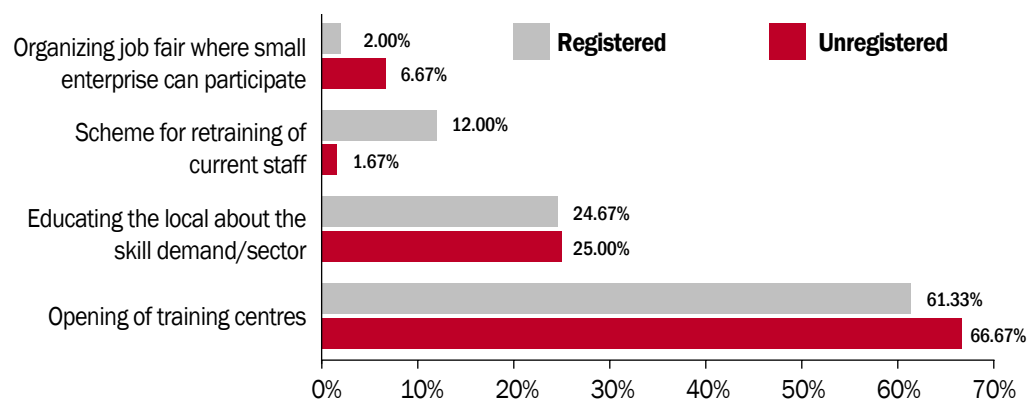


Labor

Labor would play a pivotal role in driving the economic diversification of enterprises in Bokaro, particularly as the region aims to expand beyond its traditional industrial base. Among registered enterprises, 50% employ workers with at least secondary education, and 83.3% of these businesses believe they have a sufficiently skilled workforce to support diversification. In contrast, 75% of unregistered enterprises also report having access to a skilled labor force capable of facilitating this transition. When it comes to the support needed for successful diversification, the majority of enterprises express a strong demand for more training centers, followed by initiatives to educate the local population about emerging non-coal sectors and the skills required for them.

Figure 42: Support needed for skilled manpower for diversification in Bokaro

This figure illustrates the support needed to develop skilled manpower for diversification in Bokaro, emphasizing key areas such as establishing training centers and educating the local youth.

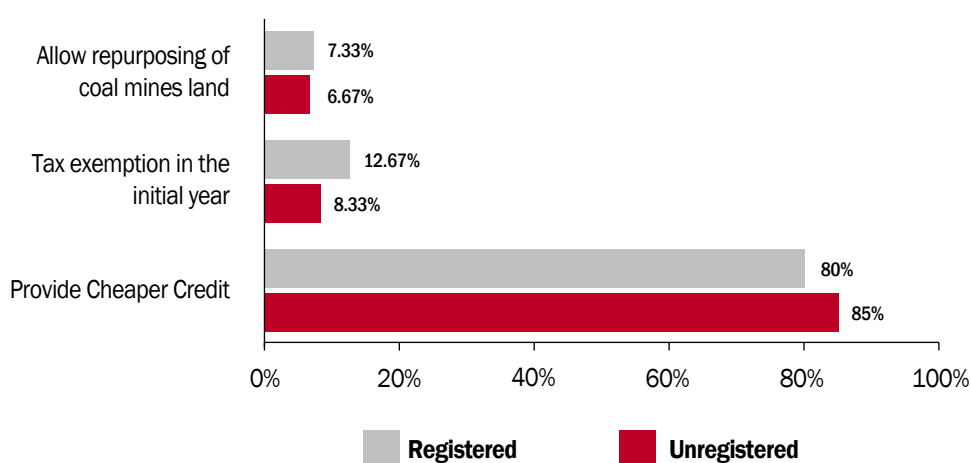


Finance

Access to finance is a critical enabler for the successful economic diversification of enterprises in Bokaro. As the region aims to reduce its dependence on coal and heavy industry, businesses require substantial financial backing to invest in advanced technologies, modernize infrastructure, and explore opportunities in non-coal sectors. In this context, the provision of affordable credit emerges as the most crucial form of support, as highlighted by both registered and unregistered enterprises. Cheaper credit would not only ease the financial burden on businesses but also enable them to take risks and innovate, ultimately driving sustainable economic growth in the region.

Figure 43: Financial support required by enterprises in Bokaro

The figure shows the financial support required by enterprises. A key need for registered enterprises is access to lower cost financing.



3.2.2 Pathways for diversification in Bokaro

Bokaro has historically been an industrial district. In addition to mining, the district has one of the oldest thermal power plants and also India's biggest steel plant. The district also has thick forest cover in some of its blocks which provide livelihood in forest-based products like lac, honey etc. Although the industrial base of the district is strong, the industries which are developed in the district are largely so because of the availability of coal. In the event of a coal phase-down, whether due to reserve depletion or climatic action, Bokaro needs to diversify economically to have a prosperous and resilient future. In this section of the study the aspirations of households and enterprises are taken into consideration. Next, they are mapped against the natural potential of the different blocks of the districts as well as the different government schemes which support different identified sectors .

Solar manufacturing and assembly

Nearly four out of ten enterprises find the solar energy sector—both manufacturing and assembly—as a potential sector for economic diversification in the district. The reason for this high interest in this sector is due to an anticipated demand in the manufacturing and installation of solar panels due to the state government policy, the national solar mission, and much talked about PM Surya Ghar Yojana for rooftop solar, which aims to install 10 million rooftop solar across the country.⁴⁵

Map 3: Block-wise sectors for diversification in Bokaro

We identified potential sectors in different blocks based on our survey findings, interviews, and focus group discussions, taking into account the existing comparative advantages and policy support for each sector.



Challenges

- **Lack of investment in the solar sector:** Solar manufacturing and deployment are capital-intensive businesses and the state lacks a framework to attract such investments. Most investors and large renewable energy companies prefer southern and western states given they are also demand centers.
- **Lack of a skilled workforce:** Our survey and qualitative interviews found that skilling is a major issue in both the solar installation and manufacturing spaces. As the sector is new and still growing, there are very few trained professionals in the field. At the national level, the government is struggling to meet the demand for skilled professionals for solar installations. Therefore, the government is planning to train 100,000 youths in this sector across the country.⁴⁶

Opportunities

- **Potential for local employment creation:** The solar sector can provide opportunity across skill levels. Solar installation and manufacturing sectors require different types of workers, from skilled professionals to manual laborers. Therefore, local employment generation would be the most important opportunity for the growth of the sector.
- **Strong push from the government provides for immediate opportunities:**

The renewable energy sector, mainly solar, is a priority sector for both the state and central governments. The state government has revised its solar target to 4 GW⁴⁷ by 2027 and also announced a slew of measures to promote solar power in the state. At the same time, the central government's PM Surya Ghar Scheme means to deploy rooftop solar installation in 10 million households across the country.⁴⁸ The strong push from the government has created a favorable environment for businesses to invest and grow in the sector. Additionally, CCL and SAIL have announced solar farms of different capacities in their area of operation.

Recommendations

Focus blocks: Chas, Chandankiyari, Bermo, Chandrapura

- **Promote skill development to match anticipated demand in solar sector:** The skill gap in the solar sector is a major hindrance to the growth of the sector. The district administration, along with the skill development office at the district level, the Deen Dayal Upadhyaya Grameen Kaushalya Yojana⁴⁹ (DDUGKY), a flagship scheme under the Ministry of Rural Development, and the implementation agency of the state should coordinate and plan a skill development roadmap for the promotion of the solar sector in the district. This will help in employment generation and also enable the steady implementation of the PM Surya Ghar scheme. To this end, CSR funds of companies like SAIL and CCL can be leveraged.
- **Development of industrial parks dedicated to the solar sector:** The district administration, along with the Jharkhand Industrial Area Development Authority (JIADA) and Department of Industry should identify land parcels and develop solar industrial parks that can be set up either in the Bermo or Chandrapura blocks of the district. Both these blocks have traditionally been an industrial hub and they can provide a strong industrial ecosystem for the development of solar industrial parks.
- **Promote repurposing of old coal mine sites:** The district has total 3,830 hectares of land under open-cast coal mines.²⁵ State-owned enterprises like CCL in the district also have their own solar target. To promote the solar manufacturing and installation sector in the state, the district administration should help these SoEs achieve their targets and create a solar ecosystem in the state. In the Bermo and Nawadih blocks, there are large areas that have been abandoned. These areas can be repurposed for solar projects. To this end, the District Mining Officer, Divisional Forest Officer and district administration should collaborate and promote the development of a solar farm by SoEs.

Forest-based industry

Bokaro district has a forest cover of 20%⁵⁰, which is nearly equal to the national average.⁵¹ This forest cover is primarily concentrated in Petarwar, Gomia and Kasmar blocks of the district. These forests produce minor forest products like Kendu leaves, Karanj seed, Saal seed, Mahua, etc.⁵¹ These higher forest cover blocks provide an opportunity for the growth of forest-based industries given the state's focus on increasing the livelihood of local communities living in these areas. There are several

schemes under the Jharkhand State Minor Forest Produce Co-operative Development and Marketing Federation Limited (JHAMCOFED) and initiatives like Abua Bir Dishom campaign. The objective of the Jharkhand Food and Feed Processing Industry Policy 2024 is to “Promote processing of Minor Forest Produce and mainstreaming of indigenous produce to enhance the income of tribal groups, forest dwellers and other vulnerable communities”³⁶. In the study, 12% of registered enterprises and 20% unregistered enterprise enterprises believe that forest product-based industry can be a promising sector for diversification. Given the favorable government schemes and enterprise aspirations, the blocks with higher forest cover can provide an opportunity for the processing of minor forest products. If the forestry sector’s full potential is realized, it can provide livelihoods to the local communities dependent on these areas.

Challenges

- **Unorganized and fragmented nature of sector:** The sector is highly unorganized and dominated by an anti-social, disruptive element.⁵² So, the economy of scale is missing, which inhibits the industrial scalability of the sector.
- **A lack of free and transparent markets for sale of products:** Several interviewees said that the market for forest products is controlled largely by “strong men” in the area. This inhibits any intervention and innovation for the growth of the sector. Due to the presence of miscreants, both local people income and the state exchequer is impacted.⁵²

Opportunities

- **Scaling-up production will help with community development and revenue generation:** Forest products are valuable resources for local communities. They can also help the state generate increased revenues. To attain scalability, the law and order situation in forested areas needs to be improved followed by making the sector more market-friendly and organized. To scale production and organize the sector, there is an opportunity for creating Forest producer organizations (FPOs) and Primary Agricultural Credit Societies (PACS), Vyapaar Mandal Sahyog Samity (VMSS), Primary Minor Forest Produce Co-Operative Societies (PMFPCS), and women’s SHGs.
- **Retraining unorganized workers with modern skills to create a strong modern workforce:** People traditionally involved in the sector have basic skills for harvesting and identification of the products. Skill training for the processing and packaging of the product can provide an opportunity for the sector to increase expertise in packaging. Additionally, capacity-building is needed for digital transaction, product marketing, and scientific collection of products. Development of the sector at a large scale could help create a strong local workforce that will help overall the industrialization of the area.

Recommendations

Focus blocks: Petarwar, Kasmar, Gomia

- **Foster skill development:** The district administration’s skilling department, in collaboration with the District Industries Center (DIC) for investment at-

traction, the police administration, the Forest Department, and the State Government's Department of Skill Development, should assess the skill gaps among forest product producers in the district. Based on this assessment, they should develop and implement a targeted training program to address these gaps. The state can leverage initiatives like the Green Skill Development Programme and JHAMFCOFED to enhance overall skills in processing and packaging. Additionally, capacity-building efforts should focus on digital literacy and training in using government marketplaces, enabling producers to directly sell their products. Under the Abua Bir Dishom Campaign, provisions for digital literacy training already exist. Given that over 50% of households own smartphones as per our household survey, the Skill Development Department and the Forest Department can collaborate to deliver this digital training effectively.

- **Develop Institutional mechanism for procuring forest products:** In the state, minor forest products are procured through various channels such as Primary Agriculture Credit Societies (PACS), Vyapaar Mandal Sahyog Samities (VMSS), Primary Minor Forest Produce Co-Operative Societies (PMFPCS), Women Self-Help Groups (SHGs), and NGOs.⁵³ However, during Focus Group Discussions (FGDs) in the district, concerns were raised about the inefficiency of the procurement mechanisms and delays in the process. To address this, the District Agricultural Department and the District Administration should work towards establishing a streamlined and timely procurement system.

Additionally, under a scheme initiated by the Ministry of Tribal Affairs, provisions for Minimum Support Price (MSP) for minor forest products have been introduced. The District Department of Agriculture, JHAMFCOFED, and the Minor Forest Produce Trade and Development Corporation (MPTDC), in collaboration with the Forest Department, should ensure the effective implementation of MSP-based procurement. This will encourage producers to take risks and invest in the sector, fostering growth and sustainability.

- **Develop a value chain:** It was observed during the study that the sector is largely unorganized, with a significant lack of a structured value chain. To address this, the district administration, along with the agriculture and cooperative departments, should encourage private investment in the sector to establish a robust value chain. Initiatives like Jhamfcofed, particularly through its Multi-Purpose Tribal Development Centres (MPTDCs), aim to create enabling infrastructure, provide training to tribal communities, facilitate value addition for Minor Forest Products (MFPs), and support MFP procurement.⁵⁴ Additionally, the Jharkhand Food and Feed Processing Industry Policy 2024 includes provisions for setting up collection centers and basic packaging systems at production sites.
- The Divisional Forest Officer, in collaboration with the Industry Department and the Tribal Affairs Department, should leverage these provisions under various government schemes to develop and strengthen the value chain. This integrated approach will help organize the sector, enhance value addition, and ensure sustainable growth for all stakeholders involved.

Pisciculture

The district accounts for 6.2% of the total fish production in the state.⁴² Similar to Ramgarh, Bokaro district also has a ready market for fresh fish as the local market is largely dependent on the fish supplied from the southern state. The district has water bodies in different parts as the Damodar River, which flows through the district. Unlike Ramgarh, however, there are no pilot projects in abandoned coal mines of Bokaro. Yet, the district is dotted with abandoned mine voids in Bermo, Nawadih and Gomia. The state directorate of fisheries has also identified different coal mines pit that can be repurposed for pisciculture.⁴²

Challenges

- **Lack of processing infrastructure:** The district accounts for 6.2% of the total fish production of the state. However, the infrastructure for fish production is very rudimentary and traditional. The district does not have any fish processing infrastructure: mainly packaging, cold storage, and refrigerated vehicles for the transportation of fresh fish for inter-district or inter-state transport. Therefore, inadequate storage infrastructure is a huge challenge for the growth of the sector.
- **Lack of investors:** In the survey and interviews it was observed that a lack of the investment in the sector is a major inhibiting factor for the growth of the sector. There are major challenges in attracting investment due to high interest rates and a lack of awareness among local entrepreneurs about funding and financing opportunities.

Opportunities

- **Repurposing abandoned mines for cage fishing to create local jobs and help deal with legacy environmental challenges:** Repurposing of abandoned mines will provide an opportunity to repurpose coal-mine voids for pisciculture. This will create an opportunity for diversification using existing and abandoned coal mine assets, which are a liability in many cases. Therefore, it will create a win-win situation for both the local communities and coal companies. Based on pilot surveys in Ramgarh, coal mine's void repurposing of one mine alone can provide direct employment to 55-60 people.
- **Infrastructure:** The interviews and analysis of secondary data suggest that there is not enough infrastructure available for the growth of the sector. For instance, cage pisciculture is only available in the Tenughat area, similarly there are no processing and packaging facilities. Economic diversification will create an opportunity to develop infrastructure, especially for cage pisciculture, creating a value chain using subsidies under the Jharkhand Food and Feed Policy 2021. Additionally, fisheries extension service provides an incentive to create new ponds and fish markets.⁵⁵

Recommendation

Focus blocks: Nawadih, Gomia, Petarwar

- **Identifying the void suitable for the repurposing of mines using cage**

method: During the pre-report consultation meeting at Petarwar and the subsequent field visit, it was observed that not all mines are suitable for pisciculture, as the depth of the voids and the water quality do not provide optimal conditions. The Directorate of Fisheries, under the Department of Agriculture, Animal Husbandry, and Co-operation, along with the Fisheries Research and Service, should conduct a survey of these voids to assess their suitability for fish farming. Additionally, the Divisional Forest Officer of Bokaro should be consulted in this process to ensure that suitable voids are identified and repurposed for pisciculture.

- **Avail local financing for pilot and infrastructure development:** The district administration along with CCL should use the CSR and DMF money to start a pilot project to repurpose old coal-mine voids for cage pisciculture. Additionally, these local financing sources should be used to develop infrastructure, especially cold storages around these fishing facilities.
- **Skill development and awareness:** The district administration along with the skill development officer and fisheries extension service should plan a strategy to impart skills among youths in fish processing and storage. Additionally, it is also observed that local businesses are not aware about the different schemes for the sector. The GM, DIC and fisheries extension service should proactively engage with local entrepreneurs to create awareness about the sector and guide them with the different resources and opportunities available in the sector.

Manufacturing: Non coal-based MSMEs

Bokaro district has traditionally been a manufacturing hub, and most of the manufacturing units have evolved around coal. In our survey it is observed that many enterprises are aware that there would be a decline in coal production. Additionally, Bermo also has a strong industrial culture due to coal mining in the block as well as power plants in the nearby blocks. In the light of just transition, the economic diversification of the Bermo block would be one of the most important and challenging tasks. So, given the current situation, now would be the most appropriate time for planning its diversification and launching a pilot and a strategy for the medium-term execution of the plan. Additionally, for chemical manufacturing, Chandrapura is the ideal center as it borders Dhanbad and is located on an industrial corridor.

The state government through its different schemes like JIIPP-2021,⁵⁶ chemical industry cluster development, Jharkhand MSME Policy 2023¹⁴ incentivizes the development of non coal-based MSMEs in these blocks to promote livelihoods and diversification.

Challenge:

- **Lack of a business-friendly environment:** In our survey, we found that almost 36% of industrial respondents say that they face challenges with documentation and permission-related issues. In other words, the district lacks ease of doing business. This is a major concern for most industries.
- **Unavailability of cheap financing:** Unavailability of financing prevents in-

dustries from diversifying or expanding. In addition, whatever financing is available is not cheap. This is not district specific but a broader problem for MSMEs. In the district, 8 out of 10 enterprises feel that higher interest rates are the major challenge for diversification. The government provides subsidies for setting up industry under the JIIPP 2021 scheme as well as the Jharkhand MSME Policy 2023, but due to a lack of awareness enterprises do not know about these schemes. The district through its DIC should publicize these initiatives so that entrepreneurs can take advantage of them.

Opportunities:

- **Development of new areas for manufacturing:** The district already has two industrial centers in Chas and Chandankyari. The district can expand its manufacturing base to Bermo block. First, Bermo block has a strong railway network which is well-connected to different parts of the country. Second, the old coal mines in Kargali and abandoned areas of Bokaro Colliery near Bermo station can be repurposed for the development of industrial centers.
- **Leverage schemes to expand manufacturing base:** The district can utilize various provisions under the Jharkhand Industrial and Investment Promotion Policy (JIIPP) 2021, such as a comprehensive investment project subsidy of up to INR 25 crore, with additional incentives for SC/ST, women, and investors with disabilities, as well as SGST waivers. Additionally, the Jharkhand Industrial Park and Logistics Policy 2022 provides opportunities to establish industrial parks across districts. The Jharkhand MSME Policy further supports the development of MSME clusters and skill development initiatives.

By leveraging these policies, the district can diversify its economy and position itself as a major manufacturing hub. This will help reduce its dependency on coal and build a more resilient economic future. Key focus sectors under these schemes include chemical production, electronic equipment manufacturing, IT, and textiles.

- **Generate employment opportunities:** MSME Sectors are the labour intensive sector, it produces more employment per unit of capital.⁵⁷ The growth of multiple industries under the MSME sector will open avenues for local employment generation. Given the industrial base of these areas, the local population already possesses skills suited to similar types of work. This is supported by survey findings, which indicate that 75% of registered enterprises have access to skilled workers. However, further investigation reveals that some employees require retraining, particularly in cases of diversification. This is also reflected in the survey, where 1 out of 8 enterprises expressed the need for support in retraining their current employees. Developing the MSME sector, therefore, not only creates jobs but also highlights the importance of targeted skill development and retraining programs to ensure workforce adaptability and industry growth

Recommendation

Block: Chas, Chandankyari, Chandrapura, Bermo

- **Use local resources for infrastructure buildout:** The district has multiple resources like CSR and DMF. The district can use this opportunity to build basic infrastructure to attract the investment. The district administration, industry department and CCL can coordinate to facilitate infrastructure development.
- **Improve ease-of-doing-business indicators:** The district administration should ensure the quick permissions for the enterprises in the MSME sector who want to set up industries. District administration in coordination with the District Industrial Centre must facilitate and encourage single-window clearance for MSMEs. The district should coordinate with the electricity distribution companies and ensure minimal power shutdown and timely electricity permissions.
- **Increased awareness of available opportunities:** The district administration should carry out awareness campaigns about different schemes available for different MSMEs. The district administration should coordinate with DIC to this end. It has also been observed that the DIC is under-staffed; the district should staff it sufficiently so that its mandate can be carried out properly.
- **Repurposing old mine sites:** In the Bermo block there are few old mines with large tracts of land, close to the Bermo railway station . These coal mines can be repurposed to set up an industrial park, potentially the first of its kind in the country. Given the level of coal dependency in Bermo, such repurposing could serve as a transformative step towards economic diversification.. To achieve this, the district administration, along with the General Manager (GM) of Central Coalfields' B&K Area, GM (Land & Rehabilitation) at CCL Headquarters in Ranchi, the Divisional Forest Officer (DFO) of Bokaro Division, and the Department of Forest, should collaborate to develop a comprehensive strategy for repurposing the land. Additionally, the Industries Department should be engaged to attract outside investment into an industrial park for non-coal-based MSME.

Table 12 : Sectors for diversification in Bokaro

Aspiration base, comparative advantage and government and private support for potential sectors of diversification. For Jaridih, the study couldn't identify a prime sector economic diversification.

Sector	Aspiration base	Comparative advantage	Government/private support
<p>Solar Manufacturing and assembling</p> <p>Focus blocks: Chas, Bermo, Chandankyari, Chandrapura</p>	<p>Local enterprise 10% of the registered enterprises and 5% of the unregistered enterprises perceive new sectors like solar, wind as potential sectors for diversification.</p>	<p>Manufacturing base Bokaro has a traditional industrial base due to location factors like coal, power plant and steel plant.</p> <p>Availability of sites Bokaro district has two industrial development areas - first in chas block and second in upcoming in Chandankyari block. New sites can be created in coal producing or power producing blocks of Bermo or Chandrapura due to strong railway network, stable power supply, and industrial base.</p> <p>Strong push from the government: The renewable energy sector, mainly solar, is the priority sector for both state and central governments. The state government revised the solar target to 4 GW by 2027 and also announced a lot of measures to promote solar power in the district.</p>	<p>State policy support Jharkhand Solar Policy (2022) incentivizes the investment in the sector. Jharkhand government revised solar target to 4.7 GW by 2027 and announced many measures to promote solar power in the district.</p> <p>Jharkhand Industrial and Investment Promotion Policy (JIIPP) 2021 also provides incentives for the creation of the industrial park.</p> <p>Leveraging the Central Government support The PM-Surya Ghar Scheme aims to install rooftop solar in 10 million households, creating a favorable environment for business investment. Central Coalfields Limited and Steel Authority of India Limited (SAIL) have also announced solar farms in their operational areas.</p>
<p>Forest-based industry</p> <p>Focus blocks: Peterwar and Kasmar</p>	<p>Local enterprise and household 12% of registered enterprises and 20% of unregistered enterprises perceive agro/ forest based industries as a potential sector for diversification.</p>	<p>Availability of high value forest product Minor forest products(MFP) produce like Kendu leaves, Karanj seed, Saal seed, and Mahua. These products have a high market value. In addition to these products, the products which have medicinal values are produced in these forests.</p> <p>Traditional Knowledge The local population is historically dependent on the forest products, so they have traditional knowledge of these product harvesting and if given the proper knowledge the product quality and quantity would be improved.</p>	<p>State policy support Green skill development programme provides skills to youth in the environment, forestry sectors to develop green skilled workers.</p> <p>The Jharkhand State Minor Forest Produce Co-operative Development and Marketing Federation Limited (JHAMFCOFED) promotes Minor Forest Produce (MFP) industries on a Co-operative basis</p>
<p>Pisciculture</p> <p>Focus Blocks: Nawadih, Gomia, Petarwar</p>	<p>Local enterprises: 31% unregistered and 16% registered enterprises express a preference for expanding into pisciculture as an important sector for diversification.</p>	<p>Demand for fish As the major supply of fish comes from Andhra Pradesh, a southern state of India, there is a gap in the fresh fish supply. The district has presence of water bodies in different parts of Damodar river flow through the district. The district has abandoned mine voids in Bermo, Nawadih and Gomia.</p>	<p>Leveraging government support The Jharkhand Food and Feed Processing Policy offers incentives for cold storage infrastructure, promotes fish exports, and provides stamp duty relaxation.</p>

		Hence an opportunity to repurpose coal mines voids, which provide opportunities to enhance fish production.	Jharkhand Fisheries Research & Extension supports fish seed production and skill training marketing.
<p>Manufacturing: Non-Coal Based MSME</p> <p>Focus Block: Chas, Chandankyari, Chandrapura, Bermo</p>	<p>Local enterprises: 10% registered and 5% unregistered enterprises express a preference for expanding into Non-coal based MSME like textile, pharma etc. as an important sector for diversification.</p>	<p>Strong manufacturing base Bokaro district has a strong industrial base in the BIADA area of the Chas block due to the presence of the steel plant. Hence entrepreneurs and enterprises have experience in the manufacturing sector.</p> <p>Chemical industry cluster development State government is also setting up six clusters for chemical production and Bokaro being one of the clusters.</p> <p>Attractive Government Scheme: The state government through its policy is trying to incentivize the development of the non coal and mining sector in the state. For instance Jharkhand Industrial and Investment Promotion Policy (JIIPP) 2021 provides different incentives like tax breaks, investment subsidies etc for development of electronic, ethanol production and other sectors. The state government is also setting up six clusters for chemical production and Bokaro is one of the clusters. So, there is a lot of government support which is the major push.</p>	<p>State/District Policy Support The Jharkhand Industrial and Investment Promotion Policy (JIIPP) 2021 offers various incentives, such as tax breaks and investment subsidies, to promote the development of sectors like electronics, ethanol production, and others.</p> <p>Bokaro district has a dedicated BIADA area in the district, which is located in the Chandankyari and Chas block of the district.</p>

4.0 Conclusion and Recommendations

Any coal phase-down will have a disruptive impact on Jharkhand's economy and local employment in several districts of the state, especially those with a heavy dependence on coal. Recognizing this, the government of Jharkhand created a taskforce in 2022 to provide actionable recommendations for making the state future-ready. In addition to this institutional initiative, several researchers, think-tanks and other non-state actors have been working on various aspects of just transition. Yet, there is very little work on one of the key elements of just transition –how to diversify the local economy in the face of a coal phase-down? We have attempted to fill this gap. We conducted the first ever economic diversification study focusing on two coal dependent districts of the state–Ramgarh and Bokaro, and identified sectoral pathways for diversification based on household and enterprise surveys, interviews and document analysis.

We find that while these districts are dependent on coal in various forms–employment, local revenues, social infrastructure. However, households and industries believe that their economy can diversify. They also collectively identify various sectors of diversification at a sub-district or block level. While in Ramgarh these sectors range from food processing to making M-sand from overburden, in Bokaro they range from solar to MSMEs. Overall, our people and industries identify eight sectors across two districts. We also suggest pathways for diversification for each of these sectors and give actionable recommendations for each of these sectors.

Our study shows that the needs for economic diversification for each district, and for each block within that district, would be unique. In the previous section, we provide detailed recommendations for each district and sub-district for Ramgarh and Bokaro. Here, we provide several broader recommendations that are applicable for all coal districts in Jharkhand.

First, we recommend that the state and district governments should initiate the process of **Institutionalization of just transition at sub-district level. This can manifest in the form of creating a** district just transition taskforce with a mandate to work with districts bodies for fostering economic diversification into new sectors.

Second, we recommend that **Jharkhand's taskforce should mobilize the state government for creating explicit just transition policies or implementing pilot projects for economic diversification and transition.** Economic diversification would mean large-scale planning and implementation in coal-dependent districts. This would require pilot projects and policy initiatives in the short term, something the taskforce can make a push for, together with the state authorities.

Third, to foster long-term and sustainable growth in non-coal sectors, the state and district governments should **develop infrastructure for emerging sectors identified for economic diversification.** Fourth, given the job creation potential of MSMEs, the state government should explicitly **foster the growth of micro, small and medium enterprises for economic diversification.** For this, different state and central government schemes can be levered. Fifth, as new sectors are being planned, state and local governments should **promote skill development and training programs in non-coal sectors** which will act as anchors for economic diversification. Finally, these efforts would not be “just” if local communities are not engaged. There-

fore, we recommend that an institutional mechanism should be created to **engage local communities in decision-making**.

There is no silver bullet for achieving a just transition. Nevertheless, globally, economic diversification is considered as one of the most important elements of a just transition. Our study shows pathways for economic diversification in two key coal-dependent districts of Jharkhand. We hope that by implementing our recommendations, the state can achieve a just and equitable transition to a sustainable economy.

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